9330 Parallel Cabinet

20 kVA and 40 kVA

INSTALLATION & OPERATION MANUAL

Powerware®

9330 Parallel Cabinet

20 kVA and 40 kVA

INSTALLATION & OPERATION MANUAL

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POWERWARE®

IMPORTANT SAFETY INSTRUCTIONS

Instructions Importantes Concernant La Sécurité

SAVE THESE INSTRUCTIONS

Conserver Ces Instructions

This manual contains important instructions for your Uninterruptible Power Supply (UPS) system. You should follow these instructions during the installation and maintenance of the UPS, options, accessories, and batteries.

Cette notice contient des instructions importantes concernant la sécurité.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

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Introduction

The Powerware® 9330 Parallel System can be utilized to prevent loss of valuable electronic information, minimize equipment downtime, and/or minimize the adverse effect on equipment and production due to unexpected power problems.

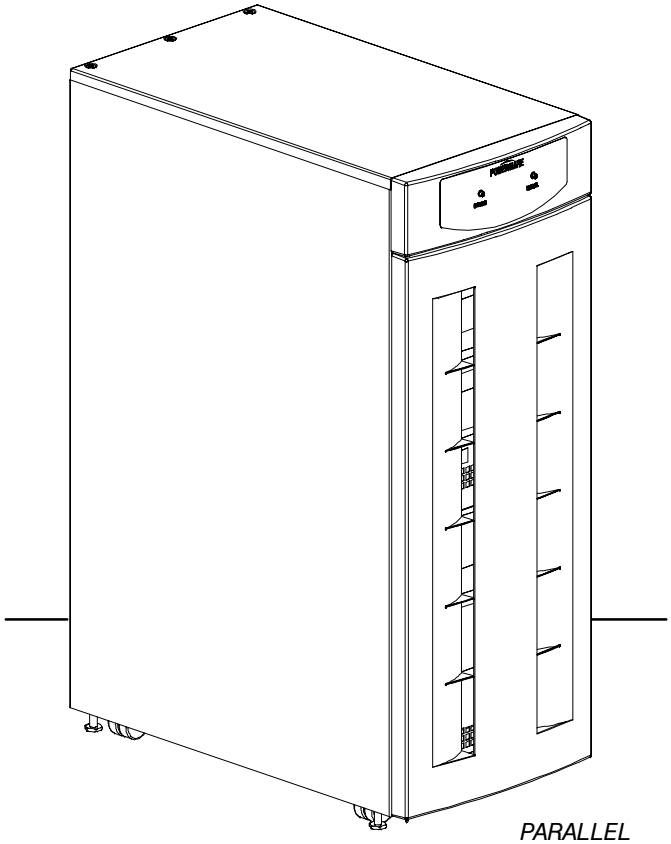
The Powerware 9330 Parallel System continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with the building's electrical system, the Parallel System supplies clean, consistent power that sensitive electronic equipment requires for reliable operation. During brownouts, blackouts, and other power interruptions, optional batteries provide emergency power to safeguard operation.

The Parallel System allows two to four UPMs to operate in parallel capacity or redundancy to provide more capacity than a single UPM and as backup for each other. In addition, when one UPM is taken out of service for maintenance or is not operating properly, a redundant UPM continues to supply uninterrupted power to the critical load. The Parallel System refers to the Parallel Cabinet in conjunction with the UPMs. The Parallel System consists of one Parallel Cabinet, and two or more UPMs. Each UPM may have its own internal battery, and/or optional battery cabinets.

This manual describes how to install and operate your Powerware® 9330 Parallel System. The installation section contains instructions for installing the Parallel Cabinet. The operation section contains instructions for operating the Parallel Cabinet and UPMs while paralleling for capacity/redundancy. The information you use depends on the system you purchased.

NOTE: *The installation procedures of this manual only refer to the Parallel Cabinet and its connection to the UPMs for parallel capacity/redundancy operation. The operation section of this manual refers to the operation for the Parallel Cabinet and the UPMs when paralleling for capacity/redundancy. For full installation and operation of the UPMs, refer to the* ***Powerware® 9330 UPS Installation and Operation*** *manual referenced at the end of this section.*

Each component of your Parallel System is housed in a free-standing cabinet. The cabinets line up and match in style and color, and have safety shields behind the doors for hazardous voltage protection. The following illustration depicts the Powerware 9330 Parallel Cabinet.



Powerware 9330 20 kVA and 40 kVA Parallel Cabinet

Basic System Configurations

These basic Parallel System configurations are possible:

- Parallel Cabinet plus two UPMs
  One capacity/one redundant (1+1)
  Two capacity (2+0)
- Parallel Cabinet plus three UPMs
  Two capacity/one redundant (2+1)
  Three capacity (3+0)
- Parallel Cabinet plus four UPMs
  Three capacity/one redundant (3+1)

Using This Manual

The Parallel System functions automatically and requires very little attention during normal operation. However, you should read and understand the procedures described in this manual and the manual provided with the UPMs to ensure trouble-free operation. In particular, you should be thoroughly familiar with the Remote Emergency Power Off procedure described in the **Powerware® 9330 UPS Installation and Operation** manual referenced at the end of this section.

The information in this manual is divided into the sections and chapters listed. The system you are installing dictates which parts of this manual you should read. Everyone should read the Introduction, Chapters 1, 3, and 4.

Introduction

The Introduction provides a brief description of the UPS system, a description of the content of each chapter, safety, text conventions used in the manual and reference information.

Section I

- **Chapter 1 – Getting Started –** tells you how to prepare your site for the installation of your Parallel System. It discusses equipment environmental requirements, inspecting, and unpacking cabinets.
- **Chapter 2 – Installing the Parallel System –** describes how to install the Parallel cabinet.

Section II

- **Chapter 3 – Understanding Parallel Operation –** provides information on understanding parallel operation.
- **Chapter 4 – Parallel Operating Instructions –** contains startup and shutdown procedures for the Parallel System.
- **Chapter 5 – Responding to System Events –** lists all the alarm messages and notices that occur during operation of the Parallel System.
- **Chapter 6 – Maintaining the UPS System –** contains maintenance instructions for the Parallel Cabinet.
- **Chapter 7 – Product Specifications –** provides detailed specifications for the Parallel Cabinet.
- **Appendix A –Customer Information –** contains important information on wiring requirements and recommendations, and important diagrams of the Parallel cabinet's mechanical details and electrical access.
- **Warranty –** provides the Powerware warranty for this product.

Read through each procedure before you begin. Perform only those procedures that apply to the Parallel system you are installing or operating.

Conventions Used in This Manual

The text in this manual uses these conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options.
- *Italic type* highlights notes and new terms where they are defined.
- Rectangular boxes containing bold type are warnings or cautions that pertain to the Parallel system or its electrical connections.

In this manual, the term *UPM* refers only to the UPM cabinet and its internal elements. The term *Parallel System* refers to the entire power protection system—the UPMs, the Parallel Cabinet, battery strings, and options or accessories installed.

Safety Considerations

The Parallel cabinet is designed for industrial or computer room applications, and contain safety shields behind the doors. However, the Parallel System is a sophisticated power system and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the Parallel system close to gas or electric heat sources.**
- **The system is not intended for outdoor use.**
- **The operating environment should be maintained within the parameters stated in this manual.**
- **Keep the cabinet closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.**
- **The Parallel System is connected to dual power sources. Lethal voltages are present even when the Parallel System is disconnected from utility power.**

WARNING:

Only AUTHORIZED SERVICE PERSONNEL should perform maintenance on or service the Parallel System.

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the Parallel System is clean and uncluttered.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**

For More Information

This manual describes how to install and operate the Parallel System. For more information about the installation and operation of the UPS modules, refer to the following:

164201300 ***Powerware® 9330 (10 kVA – 40 kVA) UPS Installation and Operation Manual***

The Installation section, provides installation instructions for the UPS cabinet, and optional components and accessories. Site preparation, planning for installation, and wiring and safety information are supplied. Detailed illustrations of cabinets and optional accessories, including dimensional and connection point drawings are provided.

The Operation section, describes the UPS cabinet controls, and explains the functions of the UPS; discusses the standard features of the UPS and optional accessories; provides procedures for starting and stopping the UPS, and information about maintenance and responding to system events.

Also described are the communications capabilities of the UPS system and remote notification.

Contact your local Powerware Field Service office for information on how to obtain copies of this manual.

Getting Help

If you need to schedule initial startup, need regional locations and telephone numbers, have a question about any of the information in this manual, or have a question this manual does not answer, please call Powerware Corporation at:

United States	**1-800-843-9433**
Canada	**1-800-461-9166**
Outside the U.S.	**Call your local representative**

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Section I

Installation

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Getting Started

1.1 Installing the Parallel Cabinet

The Parallel cabinet is shipped on a separate pallet. Use a forklift or pallet jack, rated to handle the weight of the cabinet (refer to Drawing 164201363−3 in Appendix A for cabinet weight), to move the packaged cabinet to the installation site, or as close as possible to the site, before unloading from the pallet.

This is the basic sequence of the installation steps:

1. Create an installation plan for the Parallel System (Chapter 1).
2. Prepare your site for the Parallel System (Chapter 1).
3. Inspect, unpack, and unload the Parallel cabinet (Chapter 1).
4. Wire the system (Chapter 2).
5. Complete the Installation Checklist (Chapter 2).
6. Have authorized service personnel perform preliminary operational checks and startup.

NOTE: *Startup and operational checks should be performed only by authorized service personnel. This service is usually offered as part of the sales contract for your Parallel System. Contact service in advance (usually a two week notice is required) to reserve a preferred startup date.*

1.1.1 Creating an Installation Plan

Before beginning to install the Parallel System, read and understand how this manual applies to the system being installed. Use the procedures and illustrations in the following chapters to create a logical plan for installing the system.

1.1.2 Preparing Your Site

For your Parallel System to operate at peak efficiency, your installation site should meet the environmental parameters outlined in this manual. If you intend to operate the system at an altitude higher than 1500 meters (5000 feet), contact your local sales or service office for important information about high altitude operation. The operating environment must meet the weight, airflow, size and clearance, requirements specified in Appendix A.

The basic environmental requirements for operation of the Parallel System are:

Ambient Temperature Range: 0–40˚C (32–104˚F)

Recommended Operating Range: 20–25˚C (68–77˚F)

Maximum Relative Humidity: 95%, noncondensing

The Parallel cabinet uses convection air cooling to regulate internal component temperature. Air inlets are in the front of the cabinet, and outlets are in the rear of the cabinet. You must allow clearance in front of and behind each cabinet for proper air circulation. Refer to Drawing 164201363–3 of Appendix A for clearance requirements.

1.1.3 Environment Considerations

The life of the Parallel system is adversely affected if the installation does not meet the following guidelines:

1. The system must be installed on a level floor suitable for computer or electronic equipment.
2. The system must be installed in a temperature-controlled indoor area free of conductive contaminants.

Failure to follow guidelines may invalidate Parallel System warranty.

1.1.4 Preparing for Wiring the Parallel System

For external wiring requirements, including the minimum AWG size of external wiring, refer to Tables A through E in Appendix A for the Powerware 9330 20 kVA Parallel Cabinet or Tables F through J in Appendix A for the Powerware 9330 40 kVA Parallel Cabinet. The power wiring connections for this equipment are rated at 90˚C. Control wiring should be connected at the customer interface panels and terminal blocks located inside the Parallel Cabinet and UPMs using class 1 wiring methods.

1.1.5 Inspecting and Unpacking the Cabinet

The first task in preparing for installation is inspecting and unpacking the Parallel cabinet. The Parallel cabinet is shipped bolted to a wooden pallet, as shown in Figure 1–1, and protected with outer protective packaging material.

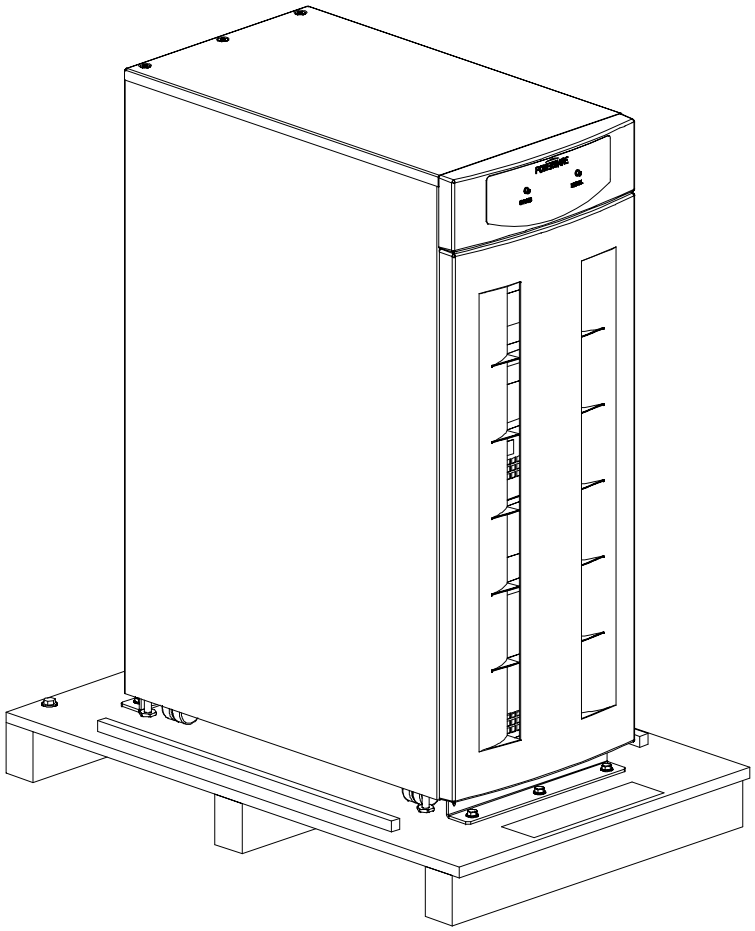


Figure 1–1. Powerware 9330 Parallel Cabinet as Shipped on Pallet

1. Carefully inspect the outer packaging for evidence of damage during transit.

CAUTION:
Do not install a damaged cabinet. Report any damage to the carrier and contact your local sales or service office immediately.

2. Use a forklift or other material handling equipment to move the cabinet to a convenient unpacking area. Insert the forklift jacks between the pallet supports on the bottom of the unit.

CAUTION:
Do not tilt cabinets more than 10 degrees from vertical.

3. Set the pallet on a firm, level surface, allowing a minimum clearance of 3 m (10 ft) on each side for removing the cabinet from the pallet.
4. Remove the protective covering from the cabinet.
5. Remove the packing material, and discard or recycle them in a responsible manner.
6. After removing the protective covering, inspect the contents for any evidence of physical damage, and compare each item with the Bill of Lading. If damage has occurred or shortages are evident, contact the Powerware, Inc. Customer Service Department immediately to determine the extent of the damage and its impact upon further installation.

NOTE: *While awaiting installation, protect the unpacked Parallel cabinet from moisture, dust, and other harmful contaminants. Failure to store and protect the Parallel cabinet properly may invalidate the warranty.*

Installing the Parallel System

2.1 Preliminary Installation Information

WARNING:
Installation should be performed only by qualified personnel.

Refer to the following while installing the system:

- Refer to Appendix A of this manual for installation drawings and additional installation notes.
- Dimensions in this manual are in millimeters and inches.
- Do not tilt the cabinets more than ±10° during installation.
- The conduit landing plates are to be removed to add conduit landing holes as required. Plate material is 16 gauge steel (0.060 in. thick).
- The cabinets must be installed on a level floor suitable for computer or electronic equipment.
- If perforated floor tiles are required for ventilation, place them in front of the Parallel System. Refer to Table R in Appendix A for equipment weight and point loading.
- Details about control wiring are provided in the Parallel Cabinet installation procedure. Drawing 164201363−2 and Table Q in Appendix A identify the control wiring terminations.

2.2 UPM Cabinet Installation

To install the UPMs, refer to the Powerware 9330 (10 kVA−40 kVA) UPS Installation and Operation manual referenced in the Introduction to this manual.

2.3 Parallel Cabinet Installation

To install a Parallel Cabinet, perform the procedures in the following paragraphs.

2.3.1 Unloading the Powerware 9330 Parallel Cabinet from the Pallet

The Parallel Cabinet is bolted to a wooden pallet supported by wood skids. To remove the pallet, perform the following procedure:

WARNING:
The Parallel Cabinet is heavy. Refer to Drawing 164201363-3 in Appendix A for weight of cabinets. If unloading instructions are not closely followed, the cabinet may cause serious injury.

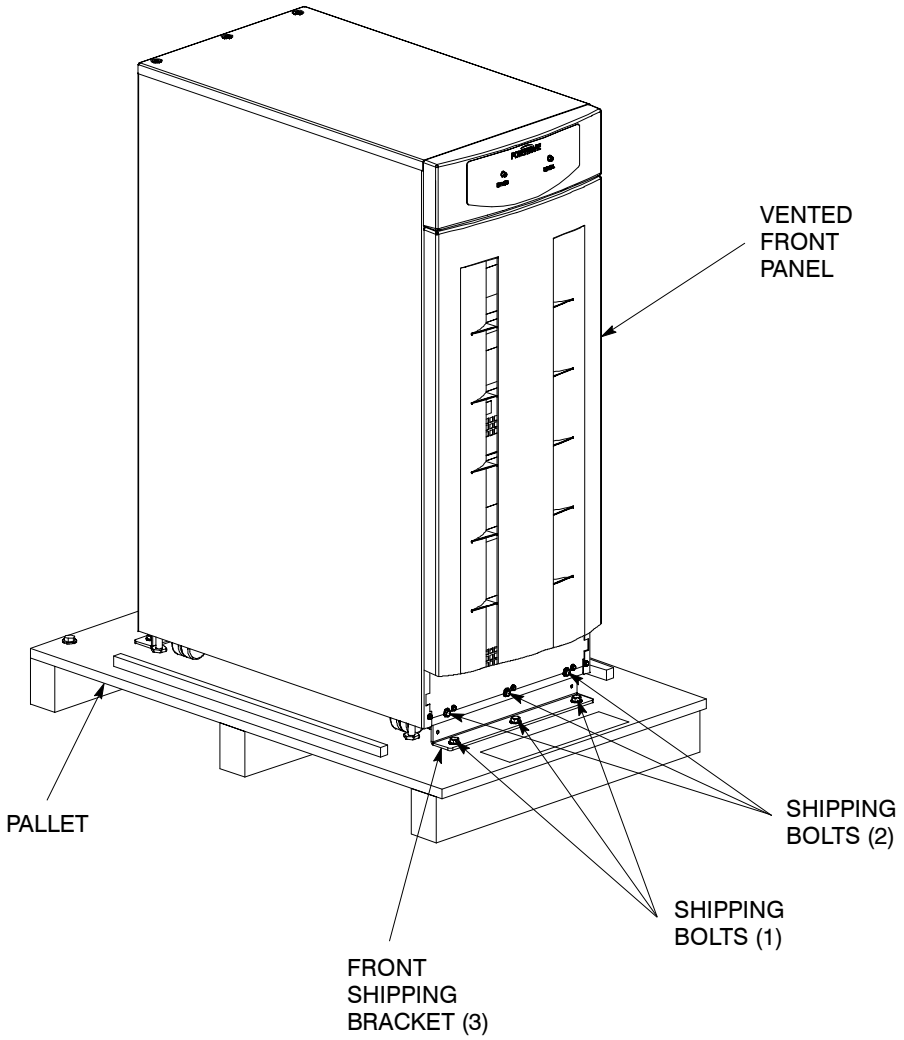
CAUTION:
Do not tilt cabinets more than 10 degrees from vertical.

1. Use a forklift or other material handling equipment to move the cabinet to the installation area. Insert the forklift jacks between the skids on the bottom of the pallet.
2. Remove front vented panel from Parallel Cabinet. The front panel is secured with magnetic latches and is removed by pulling panel straight forward to disengage magnetic latches (see Figure 2−1).
3. If the leveling feet are not fully retracted, turn the leveling feet until they are retracted.
4. Remove three bolts, (1) in Figure 2−2, securing the rear shipping bracket (3) to the cabinet and three bolts (2) securing the bracket to the pallet. Remove the rear shipping bracket. If installing cabinet permanently, retain shipping brackets and securing hardware for later use.
5. Remove three bolts, (1) in Figure 2−1, securing front shipping bracket (3) to the pallet. Do not remove bolts (2) securing the bracket to the cabinet.
6. Remove three bolts, (4) in Figure 2−2, securing removable skid (5) and remove skid.

NOTE: *In the following step the pallet will tilt and act as a ramp once the cabinet is rolled beyond the the center of the pallet. Make sure to restrain the cabinet as it continues to roll down the pallet/ramp. The front shipping bracket will act as a brake to assist restraining the cabinet.*

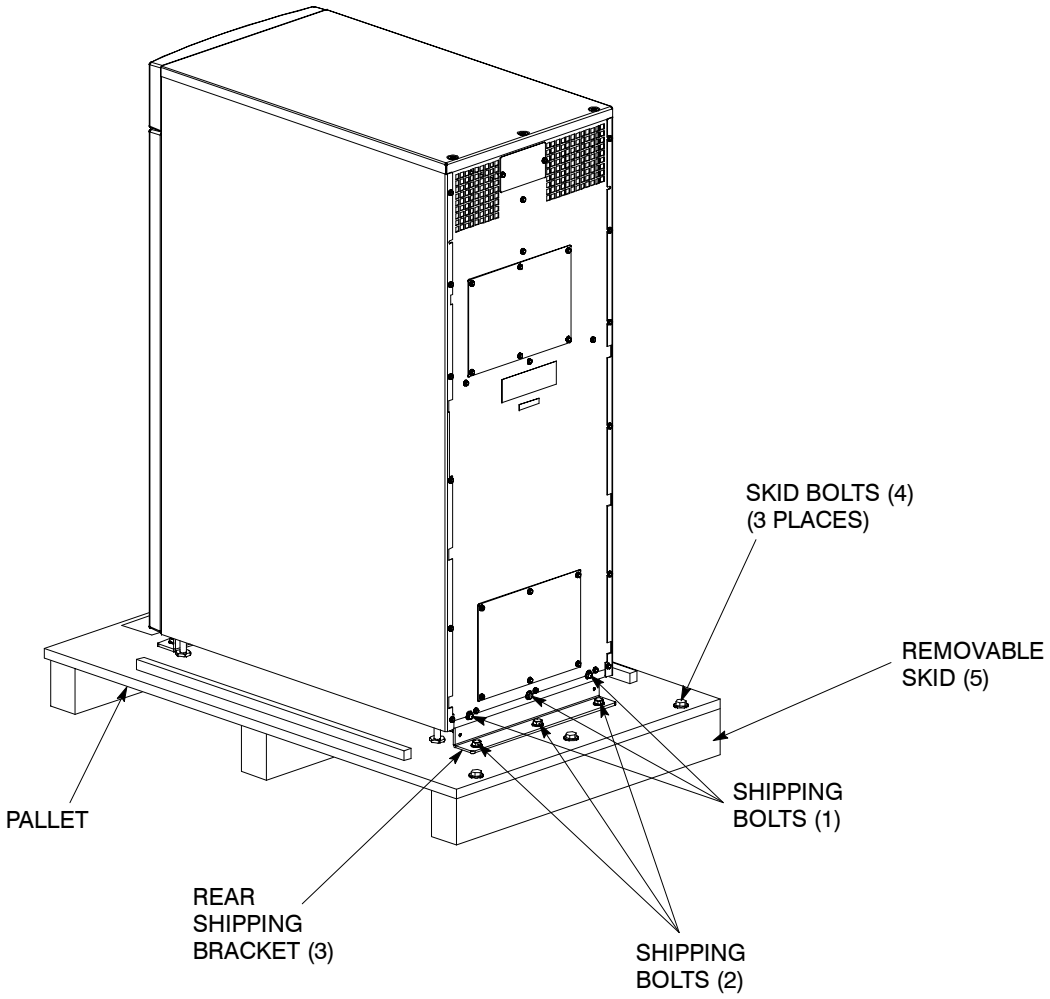
WARNING:
Do not stand directly behind the pallet while unloading the cabinet If unloading instructions are not closely followed, the cabinet may cause serious injury.

7. Slowly roll the cabinet toward the rear of the pallet. Once the pallet tilts, continue rolling the cabinet down the pallet until the cabinet is clear of the pallet.



FRONT VIEW

Figure 2–1. Removing Front Shipping Bracket (Powerware 9330 Parallel Cabinet)



REAR VIEW

Figure 2–2. Removing Rear Shipping Bracket (Powerware 9330 Parallel Cabinet)

8. Remove three bolts, (2) in Figure 2−1, securing front shipping bracket to the cabinet.
9. If installing cabinet permanently, retain shipping brackets and hardware; otherwise, discard or recycle the pallet and brackets in a responsible manner.
10. Roll cabinet to final installation location.
11. If permanently mounting the system, proceed to step 13; otherwise, proceed to step 12.
12. Secure the UPS cabinet in position by lowering the leveling feet, until cabinet is not resting on the casters and the cabinet is level.
13. Using retained hardware, reinstall shipping brackets previously removed to front and rear of UPS cabinet with the angle facing outward.(see Figures 2−1 and 2−2).
14. Secure cabinet to floor with contractor supplied hardware and proceed to paragraph 2.3.2.

2.3.2 Installing Parallel Cabinet External Power Wiring

1. Remove front vented panel from the Powerware 9330 Parallel Cabinet. Front panel is secured with magnetic latches and is removed by pulling panel straight forward to disengage magnetic latches (see Figure 2−1).
2. If side access is available, proceed to step 6; otherwise, proceed to step 3.
3. Remove top panel from Parallel Cabinet to gain access to UPM input terminals. Retain hardware.
4. Remove screws securing bottom internal safety shield panel. Remove panel to gain access to bypass input and critical load output terminals. Retain hardware.
5. Proceed to step 7.
6. Remove right and left side panels from Parallel Cabinet to gain access to input and output terminals. Retain hardware.
7. Remove input and output conduit landing plates from the Parallel Cabinet. Drill or punch conduit holes for power wiring.
8. Reinstall input and output conduit landing plates .
9. Install conduit.
10. Route UPM input power cables to Parallel Cabinet terminal blocks. Refer to Appendix A of this manual for wiring access information.

NOTE: *UPM disconnect switches must be wired in order starting with UPM 1 (e.g., UPM 1 wired to UPM disconnect switch 1).*

11. Connect phase A, B, C, and Neutral input power wiring from UPMs to the respective UPM input terminals in the Parallel Cabinet. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.
12. Route bypass input and critical load output power cables to Parallel Cabinet terminal blocks. Refer to Appendix A of this manual for wiring access information.

13. Connect phase A, B, C, and Neutral bypass input power wiring from source to the bypass input terminals on the Input/Output terminal block in the Parallel Cabinet. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.
14. Connect phase A, B, and C, and Neutral critical load output power wiring from the output terminals on the Input/Output terminal block in the Parallel Cabinet to the critical load. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.
15. After wiring the Parallel System to the facility power and critical load, be sure to ground the system according to local and/or national electrical wiring codes.
16. Remove screws securing top internal safety shield panel and remove panel to gain access to the UPM disconnect switches.
17. Close all used UPM Disconnect switches. Refer to Drawing 164201363−6 in Appendix A.
18. To install CAN, and Redundant Communication Link wiring, proceed to paragraph 2.3.3; otherwise, proceed to step 19.
19. Secure the Parallel Cabinet by reinstalling all panels removed in previous steps.

2.3.3 Installing CAN and Redundant Communication Link Wiring

The CAN and Redundant Communication Link (Building Alarm 4) wiring must be installed in conduit between each UPM and the Parallel Cabinet. Refer to Appendix A for the location of the interface points within the Parallel Cabinet.

1. Be sure all power sources are removed from the Parallel System. (See the operation section of this manual for shutdown instructions.)
2. If not already removed, remove front vented panel from the Powerware 9330 Parallel Cabinet. Front panel is secured with magnetic latches and is removed by pulling panel straight forward to disengage magnetic latches (see Figure 2−1).
3. To gain access to the Customer Interface terminal strip, TB2, remove top panel from the Parallel Cabinet by removing screws at the back and front of the top panel.
4. Remove Customer Interface conduit landing plate from the Parallel Cabinet. Drill or punch conduit holes for interface wiring.
5. Reinstall Customer Interface conduit landing plate.
6. Install conduit.
7. Refer to Appendix A of this manual for wiring requirements.
8. Locate CAN and Building Alarm 4 terminals by referring to drawings 164201363−2 and 164201363−6 in Appendix A of this manual. For connections to the UPMs, refer to Chapter 2 and Appendix A in the Powerware 9330 (10 kVA−40 kVA) UPS Installation and Operation manual referenced in the Introduction to this manual.

NOTE: *TB2 connections to the CAN must come from the first or last UPM (refer to sheet 2 of drawing 164201363−2 in Appendix A.*

9. Route and connect CAN wiring to Parallel Cabinet terminal block TB2. The CAN is wired serially (daisy chained) between terminal block TB4 in the UPMs and the Parallel Cabinet.
10. Route and connect Building Alarm 4 wiring to Parallel Cabinet terminal block TB2. Building Alarm 4, from each UPM, is wired in parallel and connected to the Parallel Cabinet.
11. When wiring is complete, secure Parallel Cabinet by reinstalling all previously removed panels.
12. Remove CAN termination jumpers (J40) from UPMs between the terminated UPM and the Parallel Cabinet (refer to sheet 2 of drawing 164201363−2 in Appendix A, for terminated and non-terminated UPMs). CAN termination jumpers are located on the Communication Server Board (CSB) in each UPM, refer to paragraph 2.2.6 *Installing Customer Connections* in the for access instructions to the CSB and to sheet 2 of drawing 164201300−2 for jumper J40 location.

2.4 Initial Startup

Startup and operational checks should be performed only by authorized service personnel. Contact service in advance (usually a two week notice is required) to reserve a preferred startup date.

2.5 Completing the Installation Checklist

The final step in installing your Parallel System is completing the following Installation Checklist. This checklist ensures that you have completely installed all hardware, cables, and other equipment. Completing all items listed on the checklist will ensure a smooth installation. You should make a copy of the Installation Checklist before filling it out, and retain the original.

After your installation is complete, a service representative will be able to verify the operation of your Parallel System and commission it to support your critical load. The service representative cannot perform any installation tasks other than verifying software and operating setup parameters. Service personnel may request a copy of the completed Installation Checklist to be sure you have completed all applicable equipment installation.

NOTE: *The Installation Checklist MUST be completed prior to starting the Parallel System for the first time.*

2.5.1 Installation Checklist

- ❑ All packing materials and restraints have been removed from each cabinet.
- ❑ Each cabinet in the Parallel System is placed in its installed location.
- ❑ A cabinet grounding/mounting kit is installed between any cabinets that are bolted together.
- ❑ All conduits, and cables are properly routed to the UPMs, Parallel Cabinet and auxiliary cabinets.
- ❑ All power cables are properly sized and terminated.
- ❑ The bypass source feeding the bypass of the Parallel Cabinet and the UPMs is from the same source of supply and is a four wire wye configuration.
- ❑ A ground conductor is properly installed.
- ❑ Control wiring between the UPMs and the Parallel Cabinet is properly installed.
- ❑ CAN is correctly terminated at UPMs.
- ❑ Air conditioning equipment is installed and operating correctly.
- ❑ The area around the installed Parallel System is clean and dust-free. (It is recommended that the Parallel System be installed on a level floor suitable for computer or electronic equipment.)
- ❑ Adequate workspace exists around the UPMs, Parallel Cabinet, and other cabinets.
- ❑ Adequate lighting is provided around all Parallel System equipment.
- ❑ A 120V service outlet is located within 25 feet of the UPMs and Parallel equipment.
- ❑ Building alarms are wired appropriately.
- ❑ Startup and operational checks performed by authorized service personnel.
- ❑ All used UPM disconnect switches are closed.

Notes

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Section II

Operation

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Understanding Parallel System Operation

3.1 Looking Inside the Parallel System

The Parallel Cabinet extends the normal operation of Powerware 9330 UPS units by offering parallel capacity/redundant capability. The Parallel system continues to maintain power to the critical loads during commercial electrical power brownout, blackout, overvoltage, undervoltage, and out-of-tolerance frequency conditions. Refer to Drawing 164201363–5 in Appendix A of this manual for the detailed relationship of the Parallel Cabinet and the UPMs.

The output of the system is normally supplied by several Uninterruptible Power Modules (UPMs). Multiple UPMs are connected with their outputs in parallel to provide a load level greater than the rating of one UPM and/or for redundancy**.** The paralleled UPMs supply the output load with protected power as long as the load does not exceed the combined rating of the paralleled UPMs.

The power system is redundant as long as one of the UPMs can be disconnected from the output bus and the remaining UPMs can continue to supply power to the load without exceeding their ratings.

The Parallel Cabinet contains components that allow the the UPMs to be paralleled and the source of system output power to be transferred between Bypass and the paralleled UPMs**.**

When the load is being supplied by the UPMs, the system output bus is continuously monitored for an over or under voltage condition. If an out of limits condition is detected, the Parallel Cabinet will transfer the load to bypass using the UPM static switches and the bypass contactor in the Parallel Cabinet.

During manual transfers to bypass or maintenance, the critical load can be supplied power through the bypass contactor in the Parallel Cabinet. The upstream bypass input and breaker must be rated for the total system load since it must supply all of the system load when on bypass.

Communication is required between the Parallel Cabinet and UPMs for full system operation. System level communications and control are accomplished using a CAN network. A single building alarm in each UPM, tied to the bypass contactor auxiliary contacts in the Parallel Cabinet, will be used for a secondary communication path.

3.2 Normal, Battery, and Bypass Modes with Parallel Operation

The Parallel system functions automatically to supply AC electrical power to the critical load. There are three standard operation modes:

- In Normal mode, the critical load is supplied clean, filtered power from the paralleled UPMs, through the Parallel Cabinet.
- In Battery mode, the battery provides DC power, which maintains UPM operation. The battery and UPM support the critical load.
- In Bypass mode, the critical load is directly supported by utility power.

The UPS continually monitors itself and the incoming utility power, and automatically switches between these modes as required, with no operator intervention, except when manually switching to Bypass mode. The sophisticated detection and switching logic inside the UPMs ensures that operating mode changes are automatic and transparent to the critical load.

The following descriptions provide the differences in Parallel System operating modes.

3.2.1 Normal Mode

In Normal mode, utility AC power is supplied to the UPMs. Power from the output of the UPMs is then supplied to the Parallel Cabinet for parallel operation. The Parallel Cabinet then supplies the critical load with clean, filtered AC power.

Figure 3–1 shows the path of electrical power through the Parallel System when the Parallel system is operating in Normal mode.

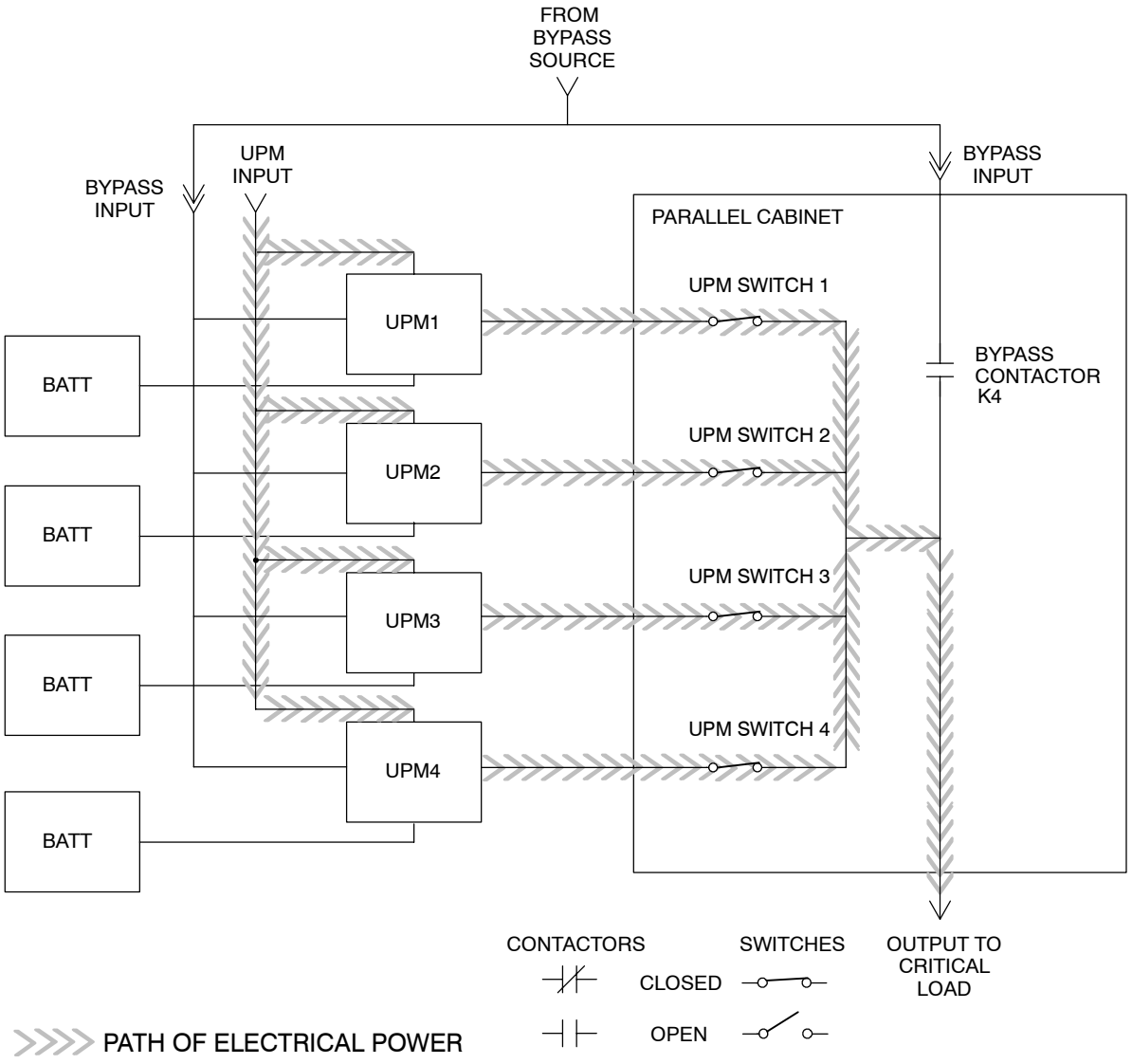

Figure 3–1. Path of Current Through the Parallel System in Normal Mode

If the utility AC power is interrupted or is out of specification, the UPMs automatically switch to Battery mode to support the critical load with no interruption. When utility power returns, the UPMs returns to Normal mode.

If the UPMs become overloaded or unavailable, the Parallel System switches to Bypass mode. The Parallel System automatically returns to Normal mode when the overload condition is cleared and system operation is restored within specified limits.

3.2.2 Bypass Mode

The Parallel System automatically switches to Bypass mode if it detects a UPM overload, UPMs unavailable, load fault, or internal failure. The bypass source supplies the commercial AC power to the load directly.

Figure 3−2 shows the path of electrical power through the Parallel System when operating in Bypass mode.

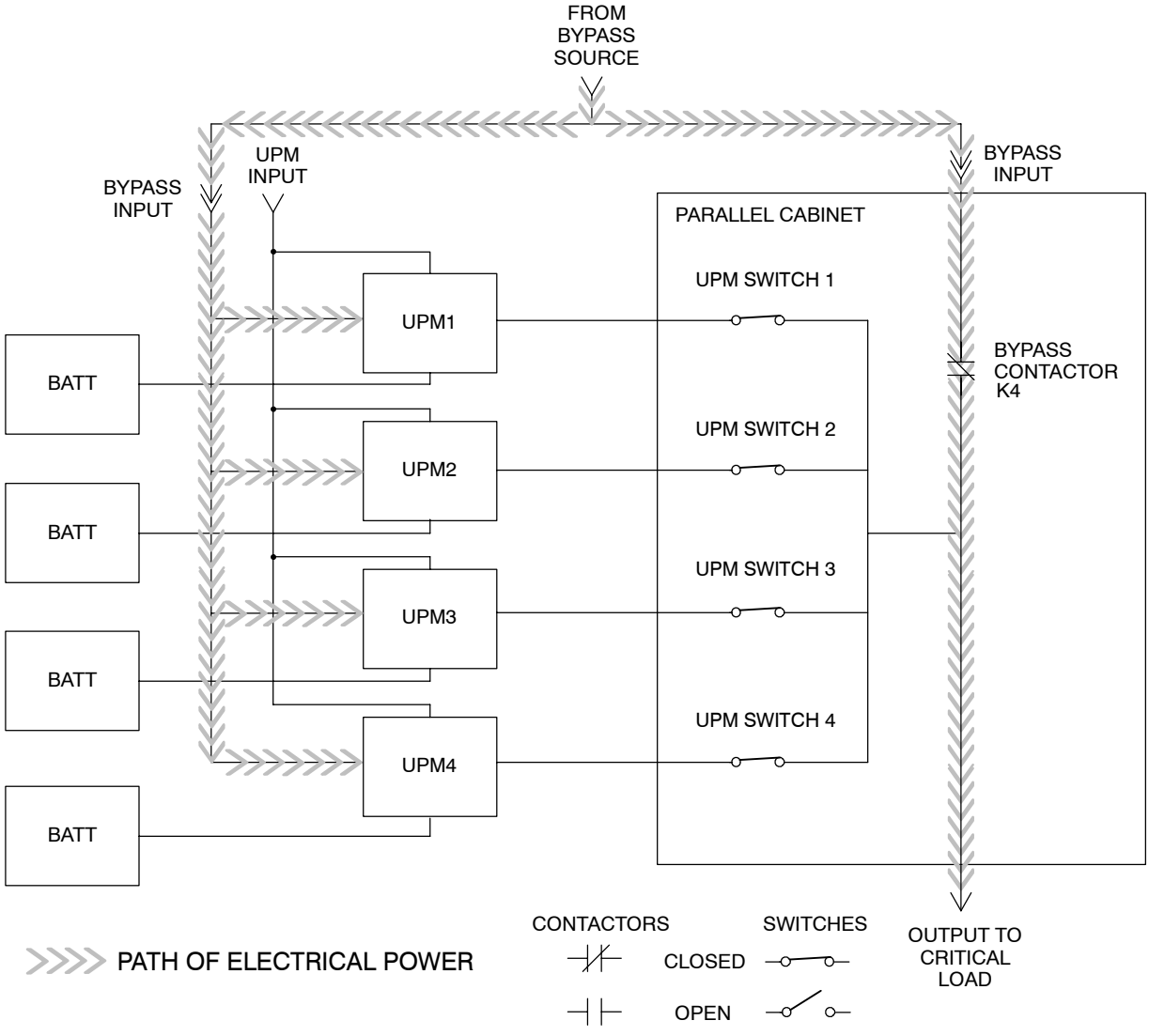

Figure 3−2. Path of Current Through the Parallel System in Bypass Mode

CAUTION:
The critical load is not protected while the Parallel Cabinet is in Bypass mode.

You can transfer the Parallel System from Normal mode to Bypass mode manually. However, the Parallel System switches automatically to Bypass mode whenever the UPMs can no longer supply the critical load. If the Parallel System transfers to Bypass mode from Normal mode due to an output voltage deviation, the Parallel System automatically attempts to transfer back to Normal mode (up to three times within a 10-minute period). The fourth transfer or an overload condition will lock the critical load on the bypass source and requires operator intervention to transfer.

Bypass mode is a normal operating mode, and not an alarm condition. However, if the Parallel System is unable to return to Normal mode following an automatic transfer to Bypass mode, an alarm condition is recorded.

3.2.3 Battery Mode

The UPMs transfer to Battery mode automatically if a utility power outage occurs, or if the utility power does not conform to specified parameters. In Battery mode, the battery provides emergency DC power that the inverter converts to AC power.

Figure 3−3 shows the path of electrical power through the Parallel System when operating in Battery mode.

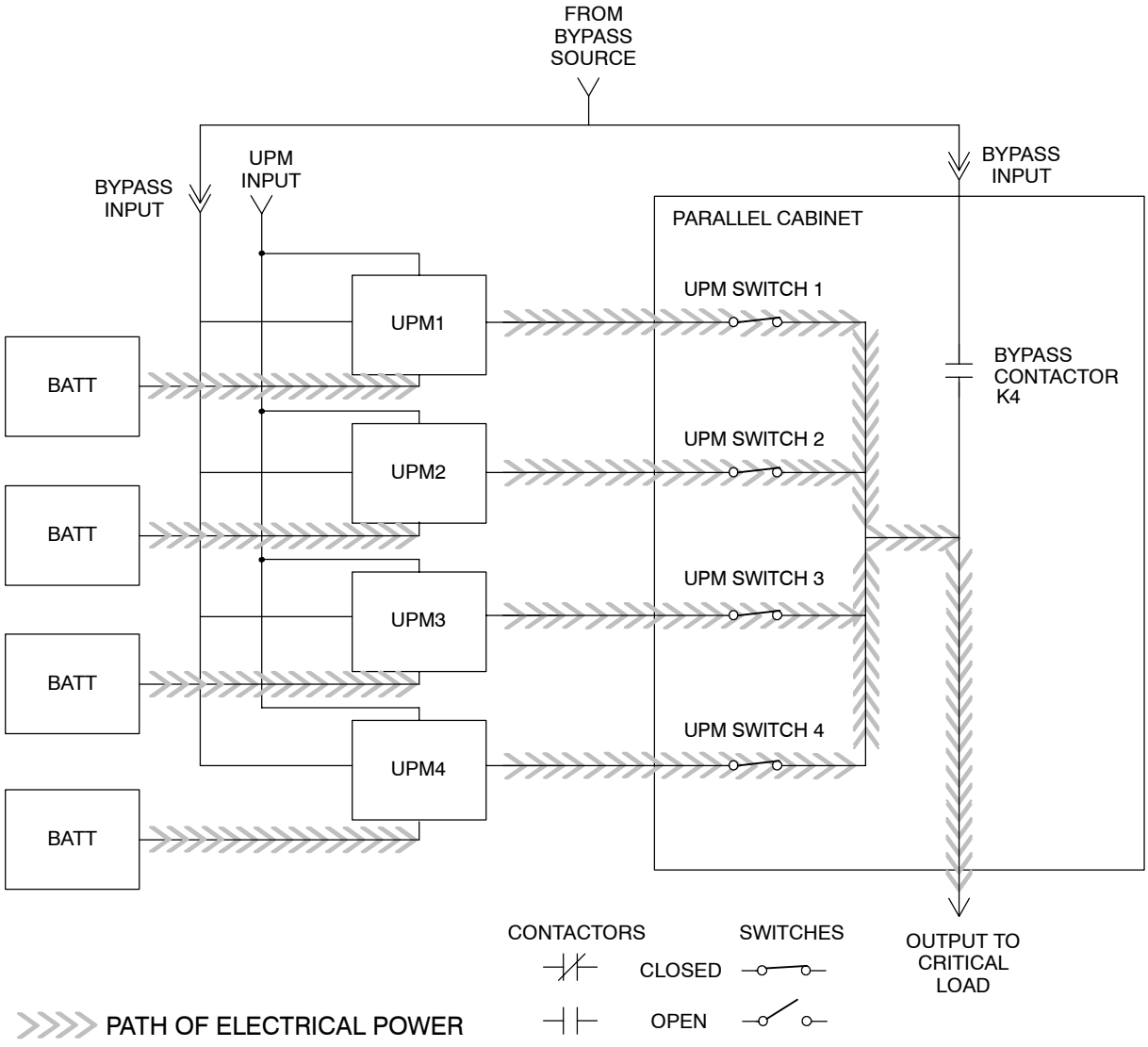

Figure 3−3. Path of Current Through the Parallel System in Battery Mode

While in battery mode, the UPMs will enunciate an audible horn, light a visual indicator lamp on the front panel (System Normal, On Battery), and make an entry into the alarm event history. As the battery discharges, the boost converter and inverter constantly make minute adjustments maintaining a steady output. The UPMs will remain in this operating mode until the input power to the rectifier is again within the specified voltage or frequency acceptance windows.

If at any time during the battery discharge the input power becomes available again, the rectifier will begin to supply DC current to the inverter. At this point, the unit returns to normal operation.

If the input power fails to return or is not within the acceptance windows required for normal operation, the battery will continue discharging until a DC voltage level is reached where the inverter output can no longer support the connected loads. When this occurs, the unit will issue another set of audible and visual alarms indicating SHUTDOWN IMMINENT. Unless the rectifier has a valid input soon, the output will only be supported for 2 minutes before the output of the system shuts down. If the bypass source is available, the system will transfer to Bypass instead of shuting down.

The systems total operating time on battery will depend on many factors. Some factors that affect battery support times are battery type and capacity, number of parallel strings, environmental temperatures, age of the battery, and fluctuations in load demand during the discharge. The greater the load, the less support time the battery will have. Decrease the load, and the battery support time will generally increase.

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Parallel System Operating Instructions

4.1 Safety Considerations

The Parallel cabinet is designed for industrial or computer room applications, and contains safety shields. However, the system is sophisticated and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the system close to gas or electric heat sources.**
- **The system is not intended for outdoor use.**
- **The system operating environment should be maintained within the parameters stated in this manual.**
- **Keep the system doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.**
- **The system contains its own power source. Lethal voltages are present even when the system is disconnected from utility power.**

WARNING:
Only AUTHORIZED SERVICE PERSONNEL should perform service or maintenance on the UPS.

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the UPS is clean and uncluttered.**
- **Battery cabinet maintenance or battery replacement should be performed only by authorized service personnel.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**
- **Always conform to the more detailed safety precautions described in "Important Safety Instructions" section of Chapter 6.**

4.2 Symbols, Controls, and Indicators

These symbols may appear on your Parallel cabinet or on labels inside the UPMs. They are accepted by most international safety agents. Everyone in your organization who works with your system should understand the meaning of these symbols:

ON
The principal power switch is in the “On” position.

OFF
The principal power switch is in the “Off” position.

PHASE
The word “phase.”

CAUTION: REFER TO MANUAL
Stop and refer to the Operator’s Manual for more information.

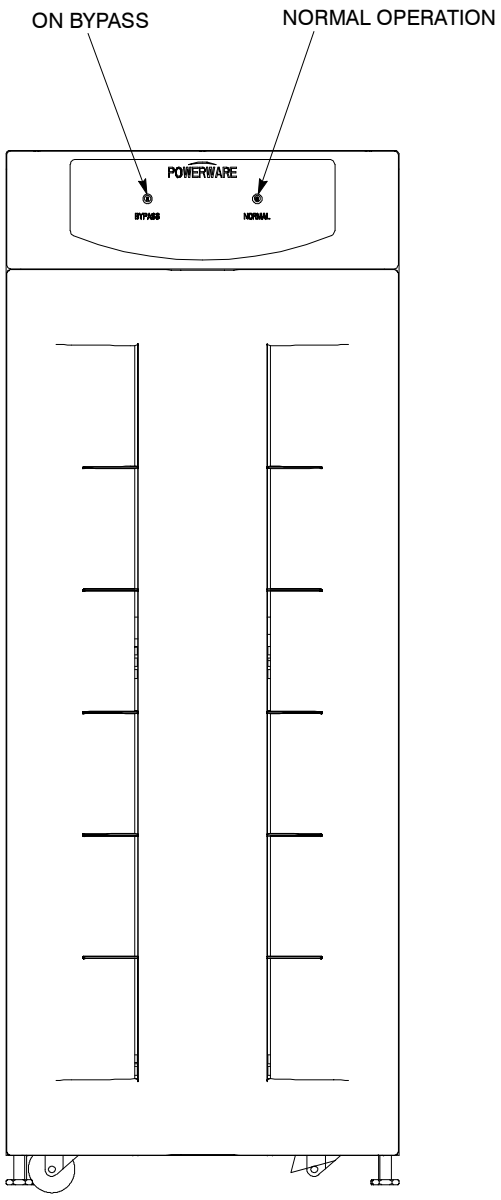
RISK OF ELECTRIC SHOCK
There is a risk of electric shock present, and you should observe associated warnings. The UPS contains high voltages.

4.3 Parallel Cabinet Indicator Lights

The Parallel Cabinet uses the following lights to indicate system status (see Figure4−1 for the location of the indicators on the Parallel Cabinet):

NORMAL OPERATION − Parallel System is operating normally and UPMs are suppling the load.

ON BYPASS − Parallel System is on Bypass.



PARALLEL CABINET

Figure 4–1. Powerware 9330 20 kVA and 40 kVA Parallel Cabinet Indicators

4.4 Operation

The following procedures provide instructions for operating the Parallel System. Refer to the **Powerware 9330 UPS Installation and Operation** manual referenced in the Introduction to this manual, for UPM operating instructions.

NOTE: *Before starting the Parallel System ensure all installation tasks are complete and a preliminary startup has been performed by authorized service personnel. The preliminary startup verifies all electrical interconnections to ensure the installation was successful and the Parallel System operates properly.*

Read the Operation section of this manual and the Operation section of the Powerware 9330 (10 kVA–40 kVA) UPS manual and have thorough knowledge of Parallel and UPS operation before attempting to operate any of the Parallel controls.

CAUTION

An illuminated LED represents a condition where a service disconnect switch is open and should not be closed. These switches are not customer accessible and a qualified service representative must be contacted to perform corrective action. To schedule a service call, contact Powerware Customer Service.

4.4.1 Starting the Parallel System in Normal Mode

To start the Parallel System, perform the following procedure:

1. Ensure the REPO switch is in the operational position.
2. Ensure the UPM circuit breakers and switches are set as follows:

UPM Input Breaker (CB1)	**OPEN**
UPM Battery Breaker (CB2)	**OPEN**
UPM Maintenance Bypass Switch	**UPS**

3. Close the Parallel Cabinet bypass input feeder circuit breaker.
4. Close all UPM input feeder circuit breakers.
5. If UPMs are dual feed, close all UPM Bypass input feeder circuit breakers.
6. Observe monitor screens on all UPMs becoming active as an indication of logic power.
7. Press the System Control pushbutton on any UPM. The System Control screen appears on each UPM.
8. On the System Control screen of each UPM, the PPU status should indicate SHUTDOWN, after approximately 20 seconds
9. On each UPM, close Battery breaker CB2.
10. If installed, close the Battery breakers on Battery cabinets.

NOTE: *If Auto Start has been enabled, the UPMs and Parallel Cabinet will start and power up to NORMAL mode automatically once CB1 is closed.*

11. On each UPM, close Input breaker CB1.

12. Select **NORMAL** from the System Control menu on any UPM.

Normal Mode Requested appears on the screen. All UPMs are commanded to turn on. If the bypass source is available, the Parallel Cabinet bypass contactor K4 closes, and the critical load is immediately supplied by the Parallel Cabinet bypass source, in Bypass mode. The **BYPASS** status indicator on the Parallel Cabinet is illuminated.

13. Observe the following messages appear sequentially on the PPU status line:

WAITING FOR INPUT
DC STARTING
INVERTER STARTING
SYNCING
ONLINE

The rectifier and inverter turn on at each UPM. When the all inverters reach full voltage, the UPM output contactors close and the Parallel Cabinet bypass contactor opens, supplying power to the critical load in Normal mode. It usually takes less than 1 minute for the Parallel System to achieve Normal mode.

14. The Parallel System is now operating in the Normal mode and the **NORMAL** status indicator on the Parallel Cabinet and all UPMs is illuminated.

4.4.2 Starting the Parallel System in Bypass Mode

If the Inverter Output of the UPMs are not available and the critical load needs to be energized, perform the following procedure:

WARNING:
In Bypass Mode, the critical load is not protected from commercial power interruptions and abnormalities.

1. Ensure the UPM circuit breakers and switches are set as follows:

UPM Input Breaker (CB1)	**OPEN**
UPM Battery Breaker (CB2)	**OPEN**
UPM Maintenance Bypass Switch	**UPS**

NOTE: *If Auto Start has been enabled, the UPMs and Parallel Cabinet will start and power up to BYPASS mode automatically once the bypass input feeder circuit breaker is closed.*

2. Close the Parallel Cabinet bypass input feeder circuit breaker.

3. Close all UPM input feeder circuit breakers.

4. If UPMs are dual feed, close all UPM Bypass input feeder circuit breakers.

5. Observe monitor screens on all UPMs becoming active as an indication of logic power.

6. Press the System Control pushbutton on any UPM. The System Control screen appears on each UPM.

7. On the System Control screen of each UPM, the PPU status should indicate SHUTDOWN, after approximately 20 seconds
8. Select **BYPASS** from the System Control menu.

   Bypass Mode Requested appears on the screen. The Parallel Cabinet bypass contactor K4 closes, and the critical load is immediately supplied by the Parallel Cabinet bypass source, in Bypass mode.
9. The Parallel System is now operating in the Bypass mode and the **BYPASS** status indicator on the Parallel Cabinet and all UPMs is illuminated.

4.4.3 Transfer from Normal Mode to Bypass Mode

To transfer the critical load to bypass, perform the following procedure:

WARNING:
In Bypass Mode, the critical load is not protected from commercial power interruptions and abnormalities.

1. Press the System Control pushbutton on any UPM. The System Control screen appears.
2. Select **BYPASS** from the System Control menu on any UPM.

   Bypass Mode Requested appears on the screen. The Parallel Cabinet bypass contactor K4 closes, all UPM output contactors open, and the critical load is immediately supplied by the Parallel Cabinet bypass source, in Bypass mode. If the bypass source is not available, the UPMs remain on and an alarm sounds.
3. The Parallel System is now operating in the bypass mode and the **BYPASS** status indicator is illuminated.

   The UPM PPU status indicates READY. System is now on bypass and all UPM power processors remain on. All UPM **BYPASS** status indicators are illuminated.

WARNING:
Power is present inside the UPMs and Parallel cabinets.

4.4.4 Transfer from Bypass Mode to Normal Mode

To transfer the critical load to normal, perform the following procedure:

1. Press the System Control pushbutton on any UPM. The System Control screen appears.
2. Select **NORMAL** from the System Control menu on any UPM.

   Normal Mode Requested appears on the screen. The UPM output contactors close and the Parallel Cabinet bypass contactor opens, supplying power to the critical load in Normal mode. If the required number of UPMs are not available, the system remains on bypass and an alarm sounds.
3. The Parallel System is now operating in the Normal mode and the **NORMAL** status indicator is illuminated.

   The UPM PPU status indicates ONLINE and the critical load is protected from commercial power interruptions and abnormalities.

4.4.5 Single UPM Shutdown

To shutdown a single UPM, perform the following procedure:

NOTE: *UPM can only be shutdown if remaining UPMs can support the critical load without being overloaded.*

1. Press the System Control pushbutton on UPM to be shutdown. The System Control screen appears.
2. Select **PPU OFF** from the System Control menu on UPM to be shutdown.

   The PPU status indicates SHUTDOWN. The input, output, and battery contactors open and the PPU is turned off.
3. On the UPM, open Input circuit breaker CB1.
4. On the UPM, open Battery circuit breaker CB2.
5. If installed, open the Battery breakers on Battery cabinets.
6. Open the UPM input and bypass (if dual feed) feeder circuit breakers.

NOTE: *The monitor screen will continue to be active until the UPM is isolated from the critical bus.*

WARNING:
Power is present inside the shutdown UPM cabinet due to internal batteries and connection to the critical bus.

7. If it is necessary to isolate the UPM from the critical bus, contact Customer Service (refer to *Getting Help* in the Introduction to this manual).

4.4.6 Restarting a Single UPM

To restart a single UPM, perform the following procedure:

1. If the UPM was isolated from the critical bus, contact Customer Service to restore connection (refer to *Getting Help* in the Introduction to this manual).
2. Observe monitor screen on the UPM becoming active as an indication of logic power.

   UPM logic is being powered from the critical bus.
3. Ensure the UPM circuit breakers and switches are set as follows:

UPM Input Breaker (CB1)	**OPEN**
UPM Battery Breaker (CB2)	**OPEN**
UPM Maintenance Bypass Switch	**UPS**

4. Close the UPM input feeder circuit breakers.
5. If UPM is dual feed, close the UPM Bypass input feeder circuit breakers.
6. Press the System Control pushbutton on the UPM. The System Control screen appears.
7. On the System Control screen, the PPU status should indicate SHUTDOWN, after approximately 20 seconds
8. On the UPM, close Battery breaker CB2.
9. If installed, close the Battery breakers on Battery cabinets.

NOTE: *If Auto Start has been enabled, the UPMs and Parallel Cabinet will start and power up to NORMAL mode automatically once CB1 is closed.*

10. On the UPM, close Input breaker CB1.
11. Select **NORMAL** from the System Control menu on UPM.

    Normal Mode Requested appears on the screen. The UPM is commanded to turn on.
12. Observe the following messages appear sequentially on the PPU status line:

    WAITING FOR INPUT
    DC STARTING
    INVERTER STARTING
    SYNCING
    ONLINE

    The rectifier and inverter turn on. When the inverter reaches full voltage, the UPM will synchronize with the output and close the output contactor. The UPM is online, in parallel with the other system UPMs.

4.4.7 Parallel System and Critical Load Shutdown

To perform maintenance or service on the critical load, shut down power to the load by performing the following procedure:

WARNING:
Using the following procedure will remove all output from the critical load. You should use this procedure only when you want to de-energize both the Parallel System and the critical load.

1. Turn off all equipment that is being powered by the Parallel System.
2. Press the System Control pushbutton on any UPM. The System Control screen appears.
3. Select **BYPASS** from the System Control menu on any UPM.
   Bypass Mode Requested appears on the screen and system transfers to bypass.
4. Select **PPU OFF** from the System Control menu on UPM to be shutdown.
   The PPU status indicates SHUTDOWN. The input, output, and battery contactors open and the PPU is turned off.
5. Repeat step 4 for each UPM, except the last UPM. The last UPM must be shutdown using the **Remote Emergency Power OFF (REPO)** pushbutton switch. Refer to “Using the **Remote Emergency Power OFF (REPO)** pushbutton switch” in this chapter.
6. To shutdown last UPM, press the **Remote Emergency Power OFF (REPO)** pushbutton switch.
7. On each UPM, open Input circuit breaker CB1.
8. On each UPM, open Battery circuit breaker CB2.
9. If installed, open the Battery breakers on Battery cabinets.

WARNING:
Power is present inside the UPM cabinets due to internal batteries.

10. Open all UPM input and bypass (if dual feed) feeder circuit breakers.
11. Open the Parallel Cabinet bypass input feeder circuit breaker.
    Load is now de-energized.

4.4.8 Using the UPM LOAD OFF Pushbutton

NOTE: *The UPM **LOAD OFF** pushbutton only controls the UPM on which Load Off was activated and will only interrupt the ability for that module to deliver power to the critical bus. The redundant modules will continue to support the critical load. UPM can only be shutdown if remaining UPMs can support the critical load without being overloaded. To remove all power from the critical load, use the **REMOTE EMERGENCY UPM OFF pushbutton.***

A UPM Load Off is initiated by the red **LOAD OFF** pushbutton on the UPM Control Panel. This pushbutton can be pressed to control the UPM output. The UPM **LOAD OFF** pushbutton only powers down the UPM .

The UPM (including Bypass) remains off until restarted.

4.4.8.1 To Use the UPM LOAD OFF Pushbutton

1. Press the **LOAD OFF** pushbutton.

   The Unit Shutdown screen appears, providing a choice to proceed with the shutdown or to abort the shutdown.

WARNING:
All output from this UPM to the critical load is lost when *YES* is selected in the following step. You should use this feature only when you want to de-energize this UPM from the critical load.

2. To shut down the UPM, select **YES** from the Unit Shutdown menu, and hold for two seconds . To abort the shutdown, select **NO**.

   When YES is selected and held for two seconds, the input, output, battery and bypass backfeed contactors open and the PPU is turned off.

CAUTION:
Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

3. To restart the UPM after pressing the **LOAD OFF** pushbutton, follow the procedure, in paragraph 4.4.6.

4.4.9 Using the REMOTE EMERGENCY POWER OFF Switch

An Emergency Power Off is initiated by **Remote Emergency Power OFF (REPO)** pushbutton switch. In an emergency, you can use this switch to control the output of the UPMs. The REPO switch de-energizes the critical load and powers down the UPMs, without asking for verification.

The UPMs, including Bypass, remain off until restarted.

4.4.9.1 To Use the REPO Switch

WARNING:
All power to the critical load is lost when this switch is activated. You should use this feature only in an emergency or when you want to de-energize the critical load.

NOTE: *The following instructions are for the Powerware supplied REPO switch. If a customer supplied REPO switch is used it may not activate in the same manner. If this is the case, refer to the operating instructions provided with the switch.*

1. Press the REPO pushbutton switch.

   The input, output, battery and bypass backfeed contactors in the UPMs, open and the PPU in the UPMs are turned off immediately, without asking for verification.

CAUTION:
Do not attempt to restart the system after REPO until the cause of the emergency has been identified and cleared.

2. To restart the UPMs after using the REPO pushbutton, reset the REPO switch by rotating the switch and then follow the procedure, in paragraphs 4.4.1 or 4.4.2.

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Responding to System Events

5.1 General

When the Parallel System is running in Normal mode, it continually monitors itself and the incoming utility power. In Bypass mode, the Parallel System may issue alarms to let you know exactly what event caused the change from Normal mode. System events on the the Parallel System can be indicated by horns, lights, messages, or all three.

All system events are presented at the UPMs. Select **Events** from the System Event menu on the UPM LCD screen to look at the Active System Events screen. This screen shows any currently active alarms, notices, or commands. (For more information on using the Events screen, refer to “Using the Control Panel” in the **Powerware 9330 UPS Installation and Operation** manual referenced in the Introduction to this manual.)

5.2 System Event Horns

The system event horn beeps according to the type of event it is signifying:

- **Horn 1** — The Horn cycles on for 1 second at a one second rate. It is normally used for all Alarm conditions.
- **Horn 2** — The Horn sounds for 3 second every three seconds. It is normally used for all Notice conditions.
- **Horn 3** — The Horn sounds for 5 second every five seconds. It is normally used to prompt the User for action.

5.3 System Event Lights

The status indicators on the UPM and Parallel cabinet Control Panels work in conjunction with the event horn to let you know when the Parallel System is operating in any mode other than Normal. Only the Normal indicator is visible during normal UPS system operation. The others light to indicate alarms or events. When an alarm occurs, you should first check these indicators to see what type of event has taken place. (For descriptions of the Parallel cabinet status indicators refer to Chapter 4 “Parallel System Operating Instructions”, and for descriptions of the UPM status indicators, refer to “Using the Control Panel” in the **Powerware 9330 UPS Installation and Operation** manual referenced in the Introduction to this manual.)

5.4 System Event Messages

When a system event occurs, a message appears on the LCD screen in the UPM Status area. This message is also is written to the Active Events log and may be added to the Events History Log. The messages are divided into four categories: Alarms, Notices, Status, and Commands. The following tables contain the events displayed on the LCD System Events screen of the Control panel.

ALARMS					
Message	Horn	Phone	Relay	Log	Indication
Battery Over Voltage	1	No	1	HA	Service Required
Battery Over Voltage OK	Off	No	1	HA	Condition Cleared
Battery Time is Low	1	No	1	HA	User Action Required
Battery Time is Low OK	Off	No	1	HA	Condition Cleared
Battery Under Voltage	1	No	1	HA	Shutdown Imminent
Battery Under Voltage OK	Off	No	1	HA	Condition Cleared
Bypass Calibration Required	1	No	1	HA	Service Required
Bypass Calibration Required OK	Off	No	1	HA	Condition Cleared
Bypass Control Failure	1	4	1	A	Service Required
Bypass Overheating Shutdown	1	No	1	HA	User Action Required
Bypass Overheating Shutdown OK	Off	No	1	HA	Condition Cleared
Bypass Overheating Warning	1	No	1	HA	Shutdown Imminent
Bypass Overheating Warning OK	Off	No	1	HA	Condition Cleared
Bypass Phase Rotation	1	No	1	HA	User Action Required
Bypass Phase Rotation OK	Off	No	1	HA	Condition Cleared
Bypass Setup Required	1	No	1	HA	Service Required
Bypass Setup Required OK	Off	No	1	HA	Condition Cleared
Calibrate DC AutoBalance	1	4	1	HA	Service Required
Calibrate DC AutoBalance OK	Off	No	1	HA	Condition Cleared
Charger Failure	1	4	1	HA	Service Required
Charger Failure OK	Off	No	1	HA	Condition Cleared
Check Battery	1	No	1	HA	User Action Required
Check Battery OK	Off	No	1	HA	Condition Cleared
Check Boost	1	4	1	HA	Service Required
Check Boost OK	Off	No	1	HA	Condition Cleared
Check CSB Setup	1	No	1	HA	Service Required
Check CSB Setup OK	Off	No	1	HA	Condition Cleared
Check Inverter	1	No	1	HA	Service Required
Check Inverter OK	Off	No	1	HA	Condition Cleared

ALARMS					
Message	Horn	Phone	Relay	Log	Indication
Check Inverter	1	4	1	HA	Service Required
Check Inverter OK	Off	No	1	HA	Condition Cleared
Check K1	1	No	1	HA	Service Required
Check K1 OK	Off	No	1	HA	Condition Cleared
Check K2	1	4	1	HA	Service Required
Check K2 OK	Off	No	1	HA	Condition Cleared
Check K3	1	4	1	HA	Service Required
Check K3 OK	Off	No	1	HA	Condition Cleared
Check K5	1	4	1	HA	Service Required
Check K5 OK	Off	No	1	HA	Condition Cleared
Check Neutral Regulator	1	4	1	HA	Service Required
Check Neutral Regulator OK	Off	No	1	HA	Condition Cleared
Check Pullchain	1	4	1	HA	Service Required
Check Pullchain OK	Off	No	1	HA	Condition Cleared
DC IN Over Voltage	1	No	1	HA	Service Required
DC IN Over Voltage OK	Off	No	1	HA	Condition Cleared
DC IN Power Supply Failure	1	No	1	HA	Service Required
DC IN Power Supply Failure OK	Off	No	1	HA	Condition Cleared
DC IN Under Voltage	1	No	1	HA	Service Required
DC IN Under Voltage OK	Off	No	1	HA	Condition Cleared
DC Link Unbalance Failure	1	No	1	HA	Service Required
DC Link Unbalance Failure OK	Off	No	1	HA	Condition Cleared
DC Link Voltage Sensing Failure	1	4	1	HA	Service Required
DC Link Voltage Sensing Failure OK	Off	No	1	HA	Condition Cleared
Display Not Responding	1	No	1	HA	Service Required
Display Not Responding OK	Off	No	1	HA	Condition Cleared
DSP Setup Required	1	No	1	A	Service Required
Fan Failed 1	1	4	1	HA	Service Required
Fan Failed 1 OK	Off	No	1	HA	Condition Cleared
Fan Failed 2	1	4	1	HA	Service Required
Fan Failed 2 OK	Off	No	1	HA	Condition Cleared
Fast DC Link Under Voltage	1	No	1	HA	Service Required
Fast DC Link Under Voltage OK	Off	No	1	HA	Condition Cleared
Gate Driver Failed 1	1	4	1	HA	Service Required
Gate Driver Failed 1 OK	Off	No	1	HA	Condition Cleared
Heat Sink Thermistor Failure	1	4	1	HA	Service Required
Heat Sink Thermistor Failure OK	Off	No	1	HA	Condition Cleared

ALARMS					
Message	Horn	Phone	Relay	Log	Indication
Input Failure	1	4	1	HA	Service Required
Input Failure OK	Off	No	1	HA	Condition Cleared
Input Phase Rotation	1	No	1	HA	User Action Required
Input Phase Rotation OK	Off	No	1	HA	Condition Cleared
Inverter DC Link OV	1	No	1	HA	Service Required
Inverter DC Link OV OK	Off	No	1	HA	Condition Cleared
Inverter DC Link UV	1	No	1	HA	Service Required
Inverter DC Link UV OK	Off	No	1	HA	Condition Cleared
Inverter Not Responding	2	No	1	HA	Service Required
Inverter Not Responding OK	Off	No	1	HA	Condition Cleared
Inverter Overheating Shutdown	1	No	1	HA	User Action Required
Inverter Overheating Shutdown OK	Off	No	1	HA	Condition Cleared
Inverter Overheating Warning	1	No	1	HA	Shutdown Imminent
Inverter Overheating Warning OK	Off	No	1	HA	Condition Cleared
Inverter Overload	1	No	1	HA	User Action Required
Inverter Setup Required	1	No	1	A	Service Required
Inverter Tripped	1	No	1	A	User Action Required
Inverter Voltage Failure	1	4	1	HA	Service Required
Inverter Voltage Failure OK	Off	No	1	HA	Condition Cleared
Load Over 100%	1	No	1	HA	Shutdown Imminent
Load Over 100% OK	Off	No	1	HA	Condition Cleared
Load Over 125%	1	No	1	HA	Shutdown Imminent
Load Over 125% OK	Off	No	1	HA	Condition Cleared
MCU Calibration Required	1	No	1	HA	Service Required
MCU Calibration Required OK	Off	No	1	HA	Condition Cleared
MCU Setup Required	1	No	1	HA	Service Required
MCU Setup Required OK	Off	No	1	HA	Condition Cleared
MCU Not Responding	1	No	1	HA	Service Required
MCU Not Responding OK	Off	No	1	HA	Condition Cleared
Not Enough UPMs	1	No	1	HA	User Action Required
Not Enough UPMs OK	Off	No	1	HA	Condition Cleared
Output Overload 100%	1	No	1	HA	User Action Required
Output Overload 100% OK	Off	No	1	HA	Condition Cleared
Output Overload 125%	1	No	1	HA	User Action Required
Output Overload 125% OK	Off	No	1	HA	Condition Cleared
Output Phase Rotation	1	No	1	HA	User Action Required
Output Phase Rotation OK	Off	No	1	HA	Condition Cleared
Parallel Setup Error	1	4	1	A	Service Required
Parallel Setup Error OK	Off	No	1	A	Condition Cleared

ALARMS					
Message	Horn	Phone	Relay	Log	Indication
Power Board Sensing Failed 1	1	4	1	HA	Service Required
Power Board Sensing Failed 1 OK	Off	No	1	HA	Condition Cleared
Rectifier Configuration Failure	1	No	1	HA	User Action Required
Rectifier Configuration Failure OK	Off	No	1	HA	Condition Cleared
Rectifier Over Voltage	1	No	1	HA	Service Required
Rectifier Over Voltage OK	Off	No	1	HA	Condition Cleared
Rectifier Under Voltage	1	No	1	HA	Service Required
Rectifier Under Voltage OK	Off	No	1	HA	Condition Cleared
SBM Bypass Failed	1	4	1	HA	Service Required
SBM Bypass Failed OK	Off	No	1	HA	Condition Cleared
Scheduled UPS Off Active	1	No	1	HA	User Action Required
Scheduled UPS Off Inactive	1	No	1	HA	User Action Required
Scheduled UPS Off/On Active	1	No	1	HA	User Action Required
Scheduled UPS Off/On Inactive	1	No	1	HA	User Action Required
Scheduled UPS On Active	1	No	1	HA	User Action Required
Scheduled UPS On Inactive	1	No	1	HA	User Action Required
Selective Trip	1	No	1	A	Service Required
Selective Trip OK	Off	No	1	A	Condition Cleared
Shutdown Imminent	1	No	1	HA	User Action Required
Shutdown Imminent Clear	Off	No	1	HA	Condition Cleared
UPS Tripped	1	4	1	A	User Action Required
Warning: Battery Time is Low	1	No	1	HA	User Action Required
Warning: Battery Time is Low OK	Off	No	1	HA	Condition Cleared

Table Key To Log Column

HA – Event recorded in History and Active Logs.

A – Event recorded in Active Log only.

NOTICES					
Message	Horn	Phone	Relay	Log	Indication
ABS: Battery DCUV	1	No	2	HA	Information Only
ABS: Battery DCUV OK	OFF	No	2	HA	Condition Cleared
Battery Current Limit	2	No	2	HA	Information Only
Battery Current Limit OK	Off	No	2	HA	Condition Cleared
Battery Not Present	2	No	2	HA	Information Only
Battery Not Present Clear	Off	No	2	HA	Condition Cleared
Battery Voltage Low	2	No	2	HA	Information Only
Battery Voltage Low OK	Off	No	2	HA	Condition Cleared
Building Alarm 1	1	1	2	HA	Information Only
Building Alarm 1 Clear	Off	No	2	HA	Condition Cleared
Building Alarm 2	2	2	2	HA	Information Only
Building Alarm 2 Clear	Off	No	2	HA	Condition Cleared
Building Alarm 3	3	No	2	HA	Information Only
Building Alarm 3 Clear	Off	3	2	HA	Condition Cleared
Building Alarm 4	3	No	2	HA	Information Only
Building Alarm 4 Clear	Off	4	2	HA	Condition Cleared
Bypass is Not Available	2	No	2	A	Protection Level
Bypass Over Frequency	2	No	2	HA	Information Only
Bypass Over Frequency OK	Off	No	2	HA	Condition Cleared
Bypass Under Frequency	2	No	2	HA	Information Only
Bypass Under Frequency OK	Off	No	2	HA	Condition Cleared
Bypass Over Voltage	2	No	2	HA	Information Only
Bypass Over Voltage OK	Off	No	2	HA	Condition Cleared
Bypass Under Voltage	2	No	2	HA	Information Only
Bypass Under Voltage Ok	Off	No	2	HA	Condition Cleared
Call Connected	2	No	2	HA	Information Only
Call Connected Clear	Off	No	2	HA	Condition Cleared
Call Phone # 1	2	No	2	HA	Information Only
Call Phone # 1 Clear	Off	No	2	HA	Condition Cleared
Call Phone # 2	2	No	2	HA	Information Only
Call Phone # 2 Clear	Off	No	2	HA	Condition Cleared
Call Phone # 3	2	No	2	HA	Information Only
Call Phone # 3 Clear	Off	No	2	HA	Condition Cleared
Call Phone # 4	2	No	2	HA	Information Only
Call Phone # 4 Clear	Off	No	2	HA	Condition Cleared
Calling Unsuccessful	3	No	2	A	Information Only
Calling Phone #1	2	No	2	HA	Information Only
Calling Phone #1 OK	Off	No	2	HA	Condition Cleared

NOTICES					
Message	Horn	Phone	Relay	Log	Indication
Calling Phone #2	2	No	2	HA	Information Only
Calling Phone #2 OK	Off	No	2	HA	Condition Cleared
Calling Phone #3	2	No	2	HA	Information Only
Calling Phone #3 OK	Off	No	2	HA	Condition Cleared
Calling Phone #4	2	No	2	HA	Information Only
Calling Phone #4 OK	Off	No	2	HA	Condition Cleared
Check EPO Reset	2	No	2	A	User Instruction
Check Modem	2	No	2	A	User Instruction
Close Battery	3	No	2	HA	User Instruction
Close Battery OK	Off	No	2	HA	Condition Cleared
Discharging Battery	2	No	2	HA	Information Only
Discharging Battery OK	Off	No	2	HA	Condition Cleared
Emergency Transfer To Bypass	2	No	2	A	Protection Level
Input Over Frequency	2	No	2	HA	Information Only
Input Over Frequency OK	Off	No	2	HA	Condition Cleared
Input Under Frequency	2	No	2	HA	Information Only
Input Under Frequency OK	Off	No	2	HA	Condition Cleared
Input Over Voltage	2	No	2	HA	Information Only
Input Over Voltage OK	Off	No	2	HA	Condition Cleared
Input Under Voltage	2	No	2	HA	Information Only
Input Under Voltage OK	Off	No	2	HA	Condition Cleared
Inverter Initializing	No	No	2	A	Information Only
Maintenance Bypass Off	2	No	2	HA	Protection Level
Maintenance Bypass On	2	No	2	HA	Protection Level
Output Over Frequency	2	No	2	HA	Information Only
Output Over Frequency OK	Off	No	2	HA	Condition Cleared
Not Enough UPMS	1	No	2	A	Information Only
Not Enough UPMS OK	Off	No	2	A	Condition Cleared
Output Under Frequency	2	No	2	HA	Information Only
Output Under Frequency OK	Off	No	2	HA	Condition Cleared
Output Over Voltage	2	No	2	HA	Information Only
Output Over Voltage OK	Off	No	2	HA	Condition Cleared
Output Under Voltage	2	No	2	HA	Information Only
Output Under Voltage OK	Off	No	2	HA	Condition Cleared
Phone #1 Failed	3	No	2	A	Information Only
Phone #2 Failed	3	No	2	A	Information Only
Phone #3 Failed	3	No	2	A	Information Only
Phone #4 Failed	3	No	2	A	Information Only
SBM IO 1 Not Reporting	1	No	2	A	Information Only
SBM IO Not Reporting OK	Off	No	2	A	Condition Cleared

NOTICES					
Message	Horn	Phone	Relay	Log	Indication
SBM IO 2 Not Reporting	1	No	2	A	Information Only
SBM IO Not Reporting OK	Off	No	2	A	Condition Cleared
UPM 1 Not Reporting	1	No	2	A	Information Only
UPM 1 Not Reporting OK	Off	No	2	A	Condition Cleared
UPM 2 Not Reporting	1	No	2	A	Information Only
UPM 2 Not Reporting OK	Off	No	2	A	Condition Cleared
UPM 3 Not Reporting	1	No	2	A	Information Only
UPM 3 Not Reporting OK	Off	No	2	A	Condition Cleared
UPM 4 Not Reporting	1	No	2	A	Information Only
UPM 4 Not Reporting OK	Off	No	2	A	Condition Cleared
UPS MOB Open	1	No	2	A	Service Status
UPS MOB Open OK	Off	No	2	A	Condition Cleared

System Not Redundant

Table Key To Log Column

HA – Event recorded in History and Active Logs.

A – Event recorded in Active Log only.

STATUS					
Message	Horn	Phone	Relay	Log	Indication
Alarm Lamp	No	No	1	No	Service Status
Auto Mode	No	No	No	A	User Status
Bypass is Available	No	No	No	A	User Status
Charger On	No	No	No	HA	Service Status
Charger Off	No	No	No	HA	Service Status
CSB Power Supply on	No	No	No	A	Service Status
Hi–Eff Mode	No	No	No	No	User Status
Inverter On	No	No	No	HA	Service Status
Inverter Off	No	No	No	HA	Service Status
Inverter Under Voltage	1	No	No	HA	Service Status
Inverter Under Voltage OK	Off	No	No	HA	Service Status
K1 (Input) Closed	No	No	No	HA	Service Status
K1 (Input) Open	No	No	No	HA	Service Status
K2 (Battery) Closed	No	No	No	HA	Service Status
K2 (Battery) Open	No	No	No	HA	Service Status
K3 (Inverter) Closed	No	No	No	HA	Service Status
K3 (Inverter) Open	No	No	No	HA	Service Status
K5 (Backfeed) Closed	No	No	No	HA	Service Status
K5 (Backfeed) Open	No	No	No	HA	Service Status
Modem OK	No	No	No	A	User Status
Notice Lamp	No	No	2	No	Service Status
On Battery	No	No	No	A	User Status
On Bypass	No	No	No	A	User Status
PPU Shutdown	No	No	No	A	User Status
SBM Bypass	No	No	No	A	User Status
Unit Normal	No	No	No	A	User Status
UPS Power Supply	No	No	No	HA	Service Status
UPS Power Supply OK	No	No	No	HA	Service Status

Table Key To Log Column

HA – Event recorded in History and Active Logs.

A – Event recorded in Active Log only.

COMMANDS					
Message	Horn	Phone	Relay	Log	Indication
Bypass Mode	No	No	No	A	
Hi–Eff On	No	No	No	A	
Hi–Eff Off	No	No	No	A	
Load Off	No	No	No	A	
Normal Mode	No	No	No	A	
PPU On	No	No	No	A	
PPU Off	No	No	No	A	

Table Key To Log Column

HA – Event recorded in History and Active Logs.

A – Event recorded in Active Log only.

Maintaining the Parallel System

6.1 General

The components inside the Parallel cabinet are secured to a sturdy metal frame. All repairable parts and assemblies are located for easy removal, with very little disassembly. This design allows authorized service personnel to perform routine maintenance and servicing quickly.

You must schedule periodic performance checks of your Parallel system to keep it running properly. Regular routine checks of operation and system parameters will enable your system to function efficiently for many trouble-free years.

NOTE: *Refer to the Powerware 9330 (10 kVA–40 kVA) UPS Installation and Operation Manual, referenced in the Introduction to this manual, for UPM maintenance.*

6.2 Important Safety Instructions

Remember that your Parallel system is designed to supply power ***EVEN WHEN DISCONNECTED FROM THE UTILITY POWER***. The UPM interiors are unsafe until the DC power source is disconnected and the electrolytic capacitors are discharged. The Parallel cabinet is unsafe until the UPMs have been powered down and bypass power has been removed. After disconnecting the utility power and the DC power, authorized service personnel should wait at least 5 minutes for capacitor bleedoff before attempting internal access to the UPMs.

WARNING:
Servicing and maintenance should be performed by qualified service personnel only.

WARNING:
LETHAL VOLTAGE PRESENT. This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of any cabinet in the UPS system.

Since each battery string is an energy source in itself, opening the Battery Circuit Breaker does not de-energize the voltage within the battery string. **DO NOT ATTEMPT TO ACCESS ANY INTERNAL AREA OF THE BATTERY STRING YOURSELF. VOLTAGES ARE ALWAYS PRESENT IN THE BATTERY STRING.** If you suspect that a battery string needs service, you should contact your local field service office.

If the string requires service, refer to the battery manufacturer's operating manual for instructions on battery maintenance, or contact your local field service office.

Observe these precautions when working on or around batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

WARNING:
HAZARDOUS WASTE. Do not incinerate or dispose of batteries indiscriminately. Observe local and national codes.

WARNING:
Do not dispose of battery or batteries in a fire. The battery may explode.

Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes, and may be toxic.

A battery can cause electrical shock, burn from high short-circuit current, or fire. Observe proper precautions.

ATTENTION:
Une batterie peut prêsenter un risque de choc êlectrique, de brulure, ou d'incendie. Suivre les précautions qui s'imposent.

- Pour le remplacement, utiliser le même nombre et modéle des batteries.
- L'élimination des batteries est règlementée. Consulter les codes locaux à cet effet.

6.3 Performing Preventive Maintenance

The Parallel system requires very little preventive maintenance. However, the system should be inspected periodically to verify that the units are operating normally and that the batteries are in good condition.

Perform the following checks DAILY:

1. Check the area surrounding the Parallel system. Ensure the area is not cluttered, allowing free access to the unit.
2. Ensure the air intakes (vents on the front) and exhaust opening (on rear of the UPS and Parallel cabinets) are not blocked.
3. Ensure there is at least 6 inches of clearance behind the unit for proper air circulation.
4. Ensure the operating environment is within the parameters specified in Chapter 7, “Product Specifications.”
5. Ensure the UPMs and the Parallel cabinet are in Normal mode (Normal status indicator is illuminated). If an alarm lamp is illuminated or the Normal status indicators are not illuminated, contact Powerware Corporation Customer Service.
6. Ensure the red DO NOT CLOSE LEDs are not illuminated). An illuminated LED represents a condition where a service disconnect switch is open and should not be closed. These switches are not customer accessible and a qualified service representative must be contacted to perform corrective action. To schedule a service call, contact Powerware Customer Service.

Perform the following checks MONTHLY:

1. Monitor UPM parameters as described in “Using the Control Panel” of the Powerware 9330 UPS Installation and Operation Manual referenced in the Introduction to this manual.
2. Record the results of your checks and any corrective actions in a suitable log.

ANNUAL maintenance:

Annual preventive maintenance should be performed only by authorized service personnel familiar with maintenance and servicing of the Parallel system. Contact your nearest field service office for more information about service offerings.

6.4 Maintenance Training

A basic training course, available from Powerware, gives you a competent working knowledge of the Parallel System operation and teaches you how to perform first level corrective maintenance. For more information about training and other services, contact the Powerware Corporation Training Coordinator in Raleigh, North Carolina, or call Powerware Corporation field service at **1--800--843--9433**.

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Product Specifications

7

7.1 Model Numbers

The Parallel cabinet is freestanding, with safety shields behind the front panel. The Parallel cabinet is available in two output power ratings and three configurations.

System	UPS Models	Configuration
Powerware 9330	20 kVA	1 Capacity/1 Redundant
Powerware 9330	20 kVA	2 Capacity/0 Redundant
Powerware 9330	20 kVA	2 Capacity/1 Redundant
Powerware 9330	20 kVA	3 Capacity/0 Redundant
Powerware 9330	20 kVA	3 Capacity/1 Redundant
Powerware 9330	40 kVA	1 Capacity/1 Redundant
Powerware 9330	40 kVA	2 Capacity/0 Redundant
Powerware 9330	40 kVA	2 Capacity/1 Redundant
Powerware 9330	40 kVA	3 Capacity/0 Redundant
Powerware 9330	40 kVA	3 Capacity/1 Redundant

The following sections detail the input, output, and environmental specifications for the Parallel cabinet.

7.2 Parallel Cabinet Input

Operating Input Voltage (UPM Dependent)	208 VAC nominal (50/60 Hz)
Operating Input Frequency Range	±3 Hz of nominal (50 Hz or 60 Hz)
Operating Input Current	Model 20 kVA (1 Capacity/1 Redundant): 55.5 Amps Model 20 kVA (2 Capacity/0 Redundant): 111 Amps Model 20 kVA (2 Capacity/1 Redundant): 111 Amps Model 20 kVA (3 Capacity/0 Redundant): 166.5 Amps Model 20 kVA (3 Capacity/1 Redundant): 166.5 Amps Model 40 kVA (1 Capacity/1 Redundant): 111 Amps Model 40 kVA (2 Capacity/0 Redundant): 222 Amps Model 40 kVA (2 Capacity/1 Redundant): 222 Amps Model 40 kVA (3 Capacity/0 Redundant): 333 Amps Model 40 kVA (3 Capacity/1 Redundant): 333 Amps

7.3 Parallel Cabinet Output

Operating Output Voltage (UPM Dependent)	208 VAC nominal (50/60 Hz)
Operating Output Frequency Range	±0.5 Hz of nominal (50 Hz or 60 Hz)
Operating Output Current	Model 20 kVA (1 Capacity/1 Redundant): 55.5 Amps Model 20 kVA (2 Capacity/0 Redundant): 111 Amps Model 20 kVA (2 Capacity/1 Redundant): 111 Amps Model 20 kVA (3 Capacity/0 Redundant): 166.5 Amps Model 20 kVA (3 Capacity/1 Redundant): 166.5 Amps Model 40 kVA (1 Capacity/1 Redundant): 111 Amps Model 40 kVA (2 Capacity/0 Redundant): 222 Amps Model 40 kVA (2 Capacity/1 Redundant): 222 Amps Model 40 kVA (3 Capacity/0 Redundant): 333 Amps Model 40 kVA (3 Capacity/1 Redundant): 333 Amps

7.4 Environmental Specifications

Operating Temperature	0 to 40˚C without derating. The recommended operating temperature is 25˚C for maximum battery life.
Operating Altitude	Maximum 1500m (5000 ft) at 40°C without derating
Storage Temperature	−20 to +70˚C (prolonged storage above 40˚C will cause rapid battery self-discharge)
Relative Humidity (operating and storage)	95% maximum noncondensing
Acoustical Noise	N/A
EMI Suppression	Meets FCC Regulation 47, Part 15, for class A devices
Electrostatic Discharge (ESD) Immunity	Meets IEC 801−2 specifications. Withstands up to 25 kV pulse without damage and with no disturbance or adverse effect to the critical load.
System Efficiency at Full Rated Power Factor Load and Nominal Input Voltage	92%

Appendix A – Customer Information

The information in this appendix will help you plan for and install your UPS system. This appendix contains the following drawings:

- 164201363–1 Power Wiring Installation Notes
- 164201363–2 Customer Interface Wiring Installation Notes
- 164201363–3 Physical Features and Requirements
- 164201363–4 Parallel Cabinet
- 164201363–5 Oneline Drawings of Parallel System
- 164201363–6 Location of Parallel Cabinet Terminals Powerware 9330 20 kVA and 40 kVA
- 164201363–7 Parallel Cabinet Controls and Indicators
- 164201363–8 Parallel Cabinet Dimensions Powerware 9330 20 kVA and 40 kVA

Table A. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–20 Parallel Cabinet

(1 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	20
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓐ (Input current and wiring size is for each module)	Amps	55.5
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	55.5
		AWG or kcmil(ea)	4 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	55.5
		AWG or kcmil(ea)	4 (1)

Read and understand the following notes while planning your installation:

1. Refer to national and local electrical codes for acceptable external wiring practices.
2. The bypass feed into this equipment utilizes four wires.
3. Material and labor for external wiring requirements are to be provided by designated personnel.
4. For external wiring, use 90°C copper wire. See the appropriate column in Tables A through J.
5. Wire ampacities are chosen from Table 310–16 of the NEC.
6. Wire sizes computed for a 40°C ambient temperature and a single neutral wire.
7. Refer to Section I of this manual for installation Instructions.
8. UPM bypass and Parallel Cabinet bypass input feeds must come from the same source.
9. UPM disconnect switches must be wired in order starting with UPM 1 (e.g., UPM 1 wired to UPM disconnect switch 1).

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	1 of 11
REVISION:	A	*DATE:*	061502

Table B. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–20 Parallel Cabinet

(2 + 0 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	20
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	55.5
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	111
		AWG or kcmil(ea)	2/0 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	111
		AWG or kcmil(ea)	2/0 (1)

Table C. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–20 Parallel Cabinet

(2 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	20
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	55.5
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	111
		AWG or kcmil(ea)	2/0 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	111
		AWG or kcmil(ea)	2/0 (1)

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	2 of 11
REVISION: A		*DATE:*	061502

Table D. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–20 Parallel Cabinet

(3 + 0 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	20
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	55.5
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	166.5
		AWG or kcmil(ea)	250 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	166.5
		AWG or kcmil(ea)	250 (1)

Table E. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–20 Parallel Cabinet

(3 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	20
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	55.5
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	166.5
		AWG or kcmil(ea)	250 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	166.5
		AWG or kcmil(ea)	250 (1)

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	3 of 11
REVISION:	A	*DATE:*	061502

Table F. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–40 Parallel Cabinet

(1 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	40
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	111
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	111
		AWG or kcmil(ea)	2/0 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	111
		AWG or kcmil(ea)	2/0 (1)

Table G. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–40 Parallel Cabinet

(2 + 0 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	40
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	111
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	222
		AWG or kcmil(ea)	400 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	222
		AWG or kcmil(ea)	400 (1)

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	4 of 11
REVISION: A		*DATE:*	061502

Table H. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–40 Parallel Cabinet

(2 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	40
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	111
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	222
		AWG or kcmil(ea)	400 (1)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	222
		AWG or kcmil(ea)	400 (1)

Table I. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–40 Parallel Cabinet

(3 + 0 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	40
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* (Input current and wiring size is for each module) Ⓐ	Amps	111
		AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ	Amps	333
		AWG or kcmil(ea)	2/0 (3)
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓒ	Amps	333
		AWG or kcmil(ea)	2/0 (3)

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	5 of 11
REVISION:	A	*DATE:*	061502

Table J. INPUT/OUTPUT Ratings & External Wiring Requirements for

Powerware 9330–40 Parallel Cabinet

(3 + 1 Configuration)

Ratings		*Units*	*Rating 50/60 Hz*
Basic unit ratings at 0.7 lagging PF load		UPM KVA	40
		INPUT/OUTPUT VOLTAGE	208
AC INPUT	**AC Input from UPM (0.7PF)** *3Ø, (1) Neutral, (1) gnd*	Amps	111
	Minimum conductor size (number per Ø) (A) (Input current and wiring size is for each module)	AWG or kcmil(ea)	Refer to Powerware 9330 UPS Installation and Operation manual for wire size.
AC INPUT	**AC Input to Bypass (UPM Bypass)** *Full Load Current 3Ø, (1) Neutral, (1) gnd* (B)	Amps	333
	Minimum conductor size (number per Ø)	AWG or kcmil(ea)	2/0 (3)
AC OUTPUT	**AC Output to Critical Load** (C) *Full Load Current 3Ø, (1) Neutral, (1) gnd*	Amps	333
	Minimum conductor size (number per Ø)	AWG or kcmil(ea)	2/0 (3)

NOTE: Callout letter Ⓐ, Ⓑ, and Ⓒ map to drawing #164201363–5

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	6 of 11
REVISION: A		*DATE:*	061502

10. Terminals are UL and CSA rated at 90˚C. Refer to Tables K and L for power cable terminations, and Table M and N for conduit requirements. Drawing 164201363–6 shows the location of the power cable terminals inside the Parallel Cabinet.

Table K. Powerware 9330 Parallel Cabinet Power Cable Terminations
20 kVA 1+1, 2+0, 2+1, 3+0, and 3+1 Configuration
40 kVA 1+1, 2+0, and 2+1 Configurations

Terminal Function	*Terminal*	*Function*	*Size of Pressure Termination*	*Tightening Torque N-M (lb-in.)*	*Type Screw*
AC Input from Each UPM	E1	Phase A	1 – #8–#2/0	12.4(110)	3/16 Allen
	E2	Phase B	1 – #8–#2/0	12.4(110)	3/16 Allen
	E3	Phase C	1 – #8–#2/0	12.4(110)	3/16 Allen
	E12	Neutral	1 – #8–#2/0	20.3(180)	3/16 Allen
	Frame Ground	Ground	4 – #14–#1/0	5.6(50)	Slotted
AC Input To Bypass	E6	Phase A	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	E7	Phase B	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	E8	Phase C	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	3E12	Neutral	1 – #6–500 kcmil	56.5(500)	1/2 Allen
AC Output to Critical Load	E9	Phase A	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	E10	Phase B	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	E11	Phase C	1 – #6–500 kcmil	56.5(500)	1/2 Allen
	3E12	Neutral	1 – #6–500 kcmil	56.5(500)	1/2 Allen
Customer Ground	Frame Ground	Ground	4 – #14–#1/0	5.6(50)	Slotted

Table L. Powerware 9330 Parallel Cabinet Power Cable Terminations
40 kVA 3+0 and 3+1 Configurations

Terminal Function	*Terminal*	*Function*	*Size of Pressure Termination*	*Tightening Torque N-M (lb-in.)*	*Type Screw*
AC Input from Each UPM	E1	Phase A	1 – #8–#2/0	12.4(110)	3/16 Allen
	E2	Phase B	1 – #8–#2/0	12.4(110)	3/16 Allen
	E3	Phase C	1 – #8–#2/0	12.4(110)	3/16 Allen
	E12	Neutral	1 – #8–#2/0	20.3(180)	3/16 Allen
	Frame Ground	Ground	4 – #14–#1/0	5.6(50)	Slotted
AC Input To Bypass	E6	Phase A	4 – #14–#2/0	20.3(180)	3/16 Allen
	E7	Phase B	4 – #14–#2/0	20.3(180)	3/16 Allen
	E8	Phase C	4 – #14–#2/0	20.3(180)	3/16 Allen
	3E12	Neutral	6 – #14–#2/0	20.3(180)	3/16 Allen
AC Output to Critical Load	E9	Phase A	4 – #14–#2/0	20.3(180)	3/16 Allen
	E10	Phase B	4 – #14–#2/0	20.3(180)	3/16 Allen
	E11	Phase C	4 – #14–#2/0	20.3(180)	3/16 Allen
	3E12	Neutral	6 – #14–#2/0	20.3(180)	3/16 Allen
Customer Ground	Frame Ground	Ground	8 – #14–#1/0	5.6(50)	Slotted

NOTE: Customer ground can be run in any conduit listed in Tables M and N.

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	7 of 11
REVISION:	A	*DATE:*	061502

11. Per NEC article 300-20(a), all three phase conductors must be run in the same conduit. Neutral and ground must be run in the same conduit as the phase conductors.

12. Conduit is sized to accommodate one neutral conductor and one ground conductor the same size as the phase conductor. For installations requiring an oversized neutral conductor, refer to NEC Table C1 for proper conduit size.

13. Conduit sizes were chosen from NEC Table C1, type letters RHH, RHW, RHW-2, TW, THW, THHW, THW-2.

Table M. Parallel Cabinet Power Cable Conduit Requirements Powerware 9330–20

Powerware System Configuration	*Terminal*	*Number of Wires in Conduit*	*Minimum Conduit Trade Size (inches)*	*Number of Conduits*
1+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	1.25	1
	Output (A, B, C, Neut, Gnd)	5	1.25	1
2+0	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2	1
	Output (A, B, C, Neut, Gnd)	5	2	1
2+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2	1
	Output (A, B, C, Neut, Gnd)	5	2	1
3+0	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2.5	1
	Output (A, B, C, Neut, Gnd)	5	2.5	1
3+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2.5	1
	Output (A, B, C, Neut, Gnd)	5	2.5	1

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	8 of 11
REVISION:	A	*DATE:*	061502

Table N. Parallel Cabinet Power Cable Conduit Requirements Powerware 9330–40

Powerware System Configuration	*Terminal*	*Number of Wires in Conduit*	*Minimum Conduit Trade Size (inches)*	*Number of Conduits*
1+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2	1
	Output (A, B, C, Neut, Gnd)	5	2	1
2+0	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	3	1
	Output (A, B, C, Neut, Gnd)	5	3	1
2+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	3	1
	Output (A, B, C, Neut, Gnd)	5	3	1
3+0	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2	3
	Output (A, B, C, Neut, Gnd)	5	2	3
3+1	AC Input from UPM (A, B, C, Neut, Gnd)	Refer to Powerware 9330 UPS Installation and Operation manual for conduit data.		
	AC Input to Bypass (A, B, C, Neut, Gnd)	5	2	3
	Output (A, B, C, Neut, Gnd)	5	2	3

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	9 of 11
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14. External overcurrent protection is not provided by this product, but is required by codes. Refer to Tables A through J for wiring requirements. If an output lockable disconnect is required, it is to be supplied by designated personnel.

15. Table O lists the maximum rating for bypass input circuit breakers.

Table O. Maximum Bypass Input Circuit Breaker Ratings

Powerware System Configuration	*Input Voltage Rating*
	208VAC
9330–20 (1+1)	70A
9330–20 (2+0)	150A
9330–20 (2+1)	150A
9330–20 (3+0)	225A
9330–20 (3+1)	225A
9330–40 (1+1)	150A
9330–40 (2+0)	300A
9330–40 (2+1)	300A
9330–40 (3+0)	450A
9330–40 (3+1)	450A

CAUTION: To reduce the risk of fire, connect only to a circuit provided with maximum input circuit breaker current ratings from Table O in accordance with the National Electrical Code, ANSI/NFPA 70.

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	10 of 11
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16. Output overcurrent protection and output disconnect switch are to be provided by the user. Table P lists the maximum rating for output circuit breakers satisfying the criteria for both.

Table P. Maximum Output Circuit Breaker Ratings

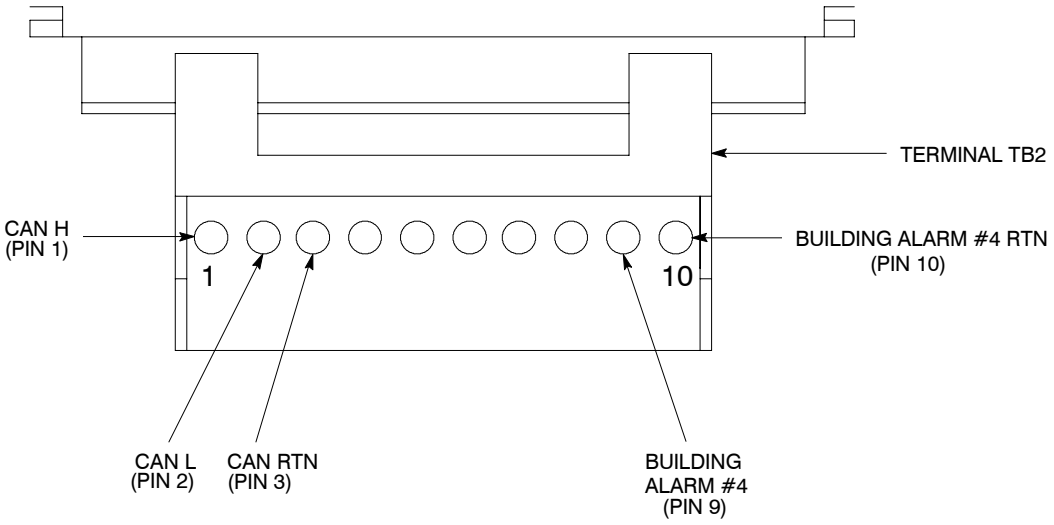
Powerware System Configuration	*Output Voltage Rating*
	208VAC
9330–20 (1+1)	70A
9330–20 (2+0)	150A
9330–20 (2+1)	150A
9330–20 (3+0)	225A
9330–20 (3+1)	225A
9330–40 (1+1)	150A
9330–40 (2+0)	300A
9330–40 (2+1)	300A
9330–40 (3+0)	450A
9330–40 (3+1)	450A

DESCRIPTION:	**POWER WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–1	*SHEET:*	11 of 11
REVISION:	A	*DATE:*	061502

1. Use Class 1 wiring methods (as defined by the NEC) for control wiring. Install the control wiring in separate conduit from the power wiring. The wire should be rated at 150 volts, 5 amp minimum.
2. Refer to Tables Q and to Chapter 2, paragraph 2.3.3 of this manual for Parallel Cabinet customer interface wiring. Refer to the Powerware 9330 UPS Installation and Operation manual, referenced in the *Introduction* to this manual, for customer interface terminal locations in the UPMs.
3. TB2 connections to the CAN must come from the first or last UPM (see sheet 2).
4. Remove CAN termination jumpers (J40) from UPMs between the terminated UPM and the Parallel Cabinet (see sheet 2, for terminated and non-terminated UPMs).

Table Q. Customer Interface Inputs and Outputs

Parallel Cabinet Terminals	Name	UPM Terminals	Description
TB2–1	CAN H	TB4–1	Parallel CAN Input
TB2–2	CAN L	TB4–2	
TB2–3	RTN	TB4–3	
TB2–9	BLDG ALARM 4	TB2–7	Redundant Communication Link
TB2–10	BLDG ALARM 4 RTN	TB2–8	

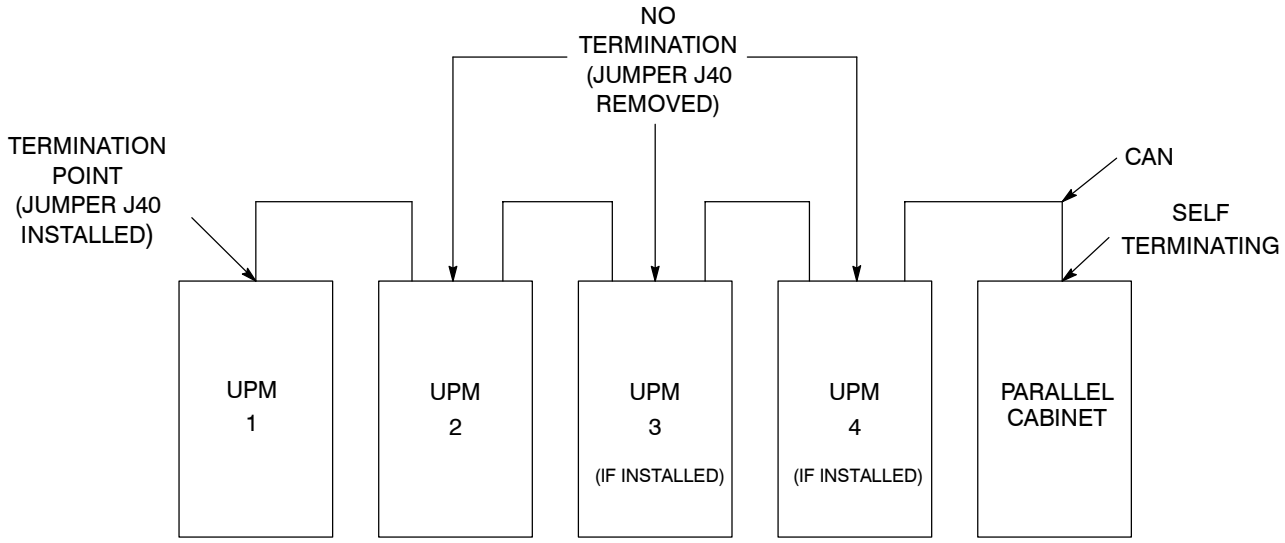


CUSTOMER INTERFACE

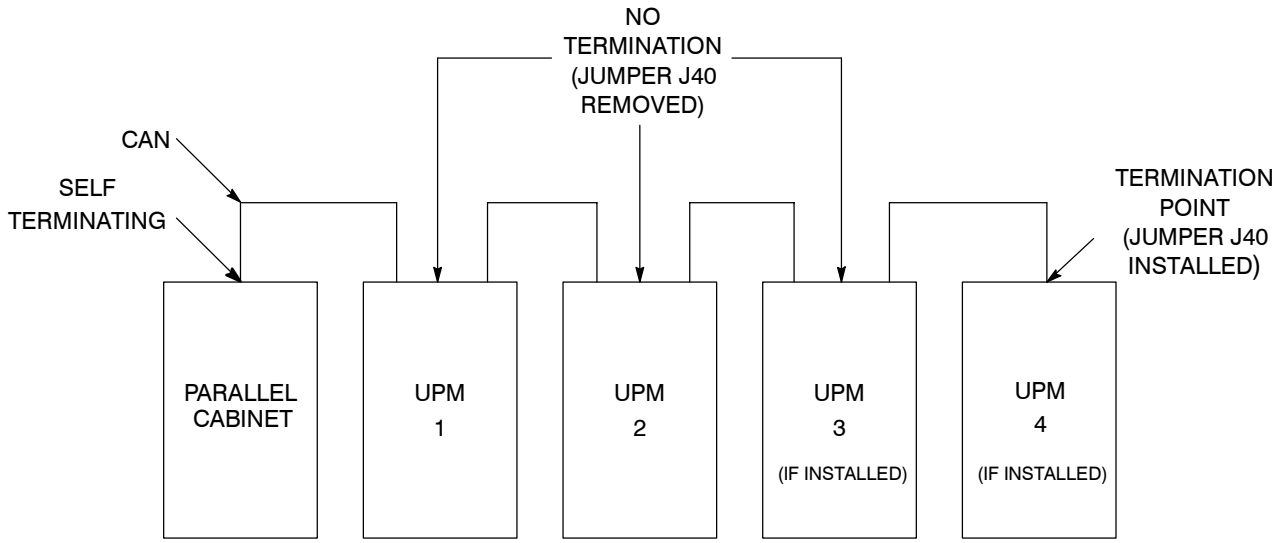
NOTE: *All control wiring is to be provided by the customer.*

DESCRIPTION:	**CUSTOMER INTERFACE WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–2	*SHEET:*	1 of 2
REVISION: A		*DATE:*	061502

CAN WIRING AND TERMINATIONS



Arrangement A



Arrangement B

NOTE: *This drawing is for Parallel Cabinet wiring purposes and is not a floor layout plan. UPMs and the Parallel Cabinet can be placed in any physical order, but must be wired in the order shown in the drawing.*

DESCRIPTION:	**CUSTOMER INTERFACE WIRING INSTALLATION NOTES**		
DRAWING NO:	164201363–2	*SHEET:*	2 of 2
REVISION:	A	*DATE:*	061502

1. The Parallel Cabinet equipment operating environment must meet the size and weight requirements shown in Table R, according to your Parallel system configuration.
2. In the Parallel System, the UPMs, and Battery cabinets are palleted separately for shipping.
3. Do not tilt cabinets more than ±10˚ during handling.
4. Dimensions are in millimeters (inches).

Table R. Equipment Weight

Component	Configuration	*Weight Kg (lb)*		
		Shipping	*Installed*	Point Loading
Parallel Cabinet Powerware 9330–20 kVA	3+1	143 (315)	116 (255)	4 at 29 (63.8)
	2+1	134 (295)	107 (235)	4 at 26.8 (58.8)
	1+1	125 (275)	98 (215)	4 at 24.5 (53.8)
Parallel Cabinet Powerware 9330–40 kVA	3+1	159 (350)	132 (290)	4 at 33 (72.5)
	2+1	145 (320)	118 (260)	4 at 29.5 (65)
	1+1	132 (290)	104 (230)	4 at 26 (57.5)

5. The clearances required around the Parallel Cabinet are shown in Table S.

Table S. System Clearances

From Front of Cabinet	36 inches working space
From Back of Cabinet	6 inches air circulation clearance
From Sides of Cabinet	Allow installation working space

6. The basic environmental requirements for operation of the Parallel Cabinet are:

Ambient Temperature Range: 0–40˚C (32–104˚F)

Recommended Operating Range: 20–25˚C (68–77˚F)

Maximum Relative Humidity: 95%, noncondensing

DESCRIPTION: **PHYSICAL FEATURES AND REQUIREMENTS**			
DRAWING NO:	164201363–3	*SHEET:*	1 of 1
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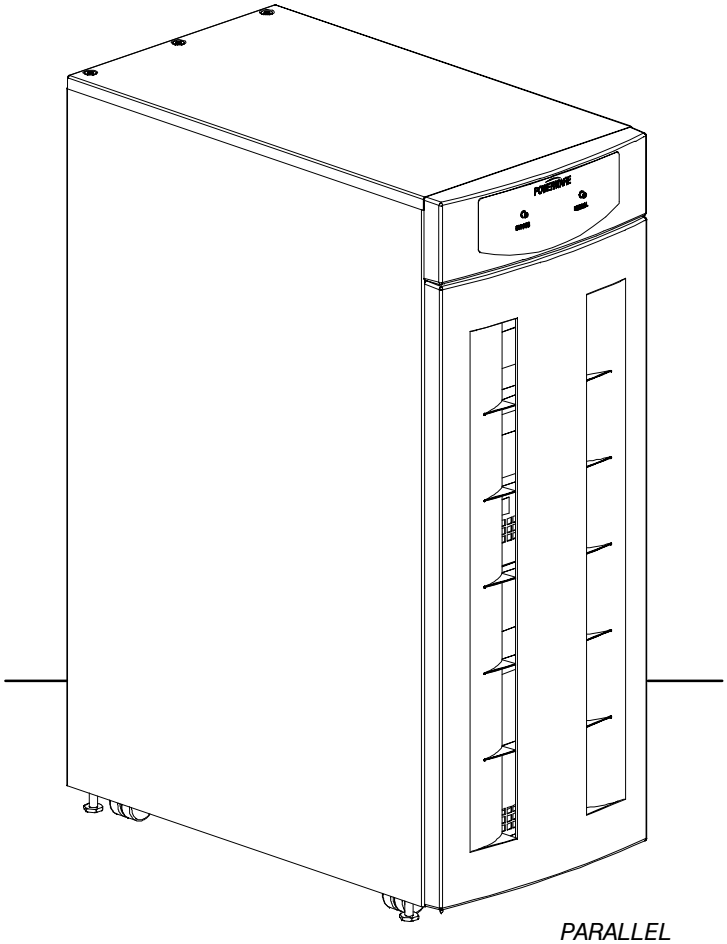
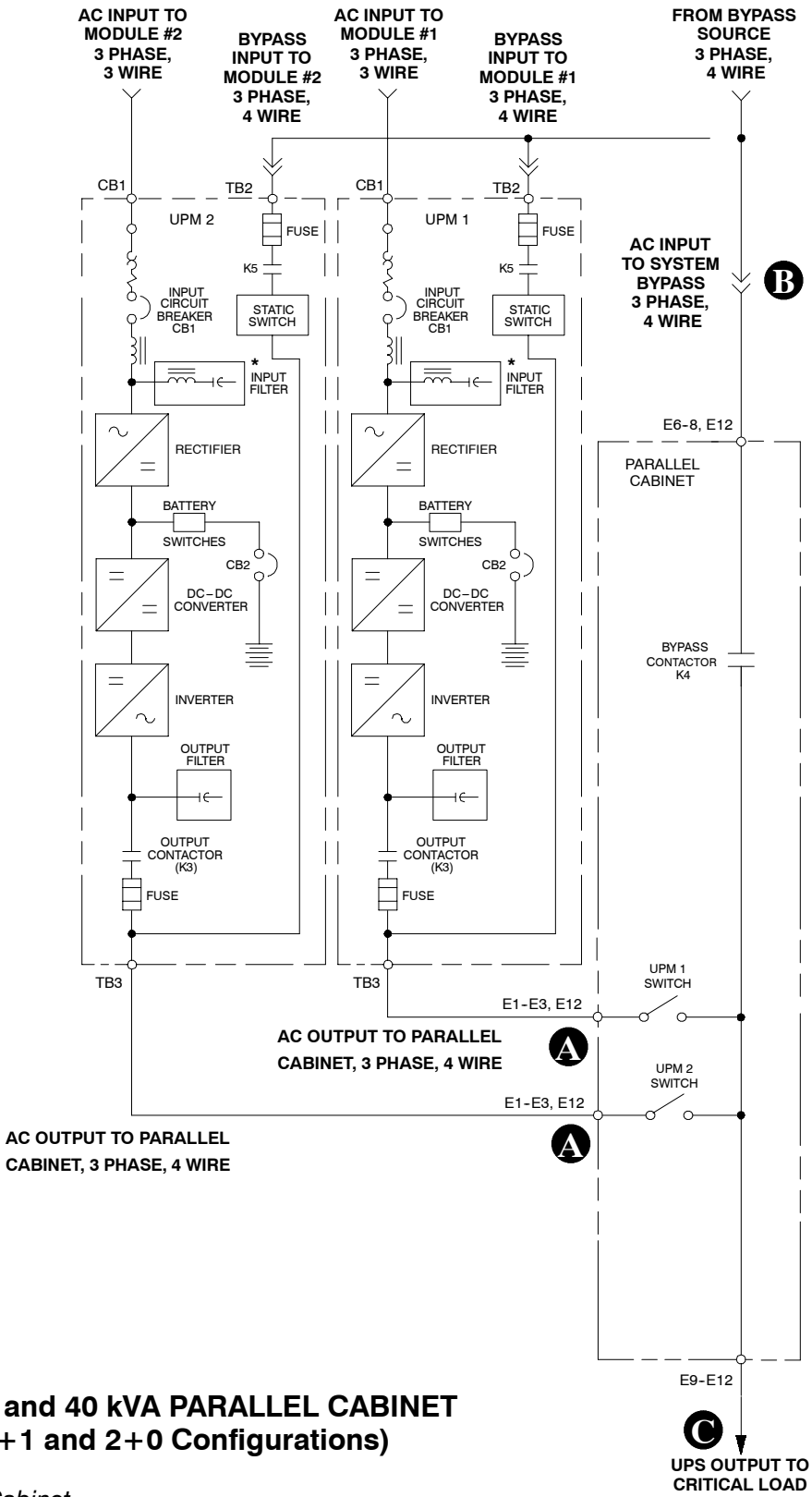


PARALLEL CABINET

POWERWARE 9330 Parallel Cabinet

DESCRIPTION:	**PARALLEL CABINET**		
DRAWING NO:	164201363–4	*SHEET:*	1 of 1
REVISION: A		*DATE:*	061502



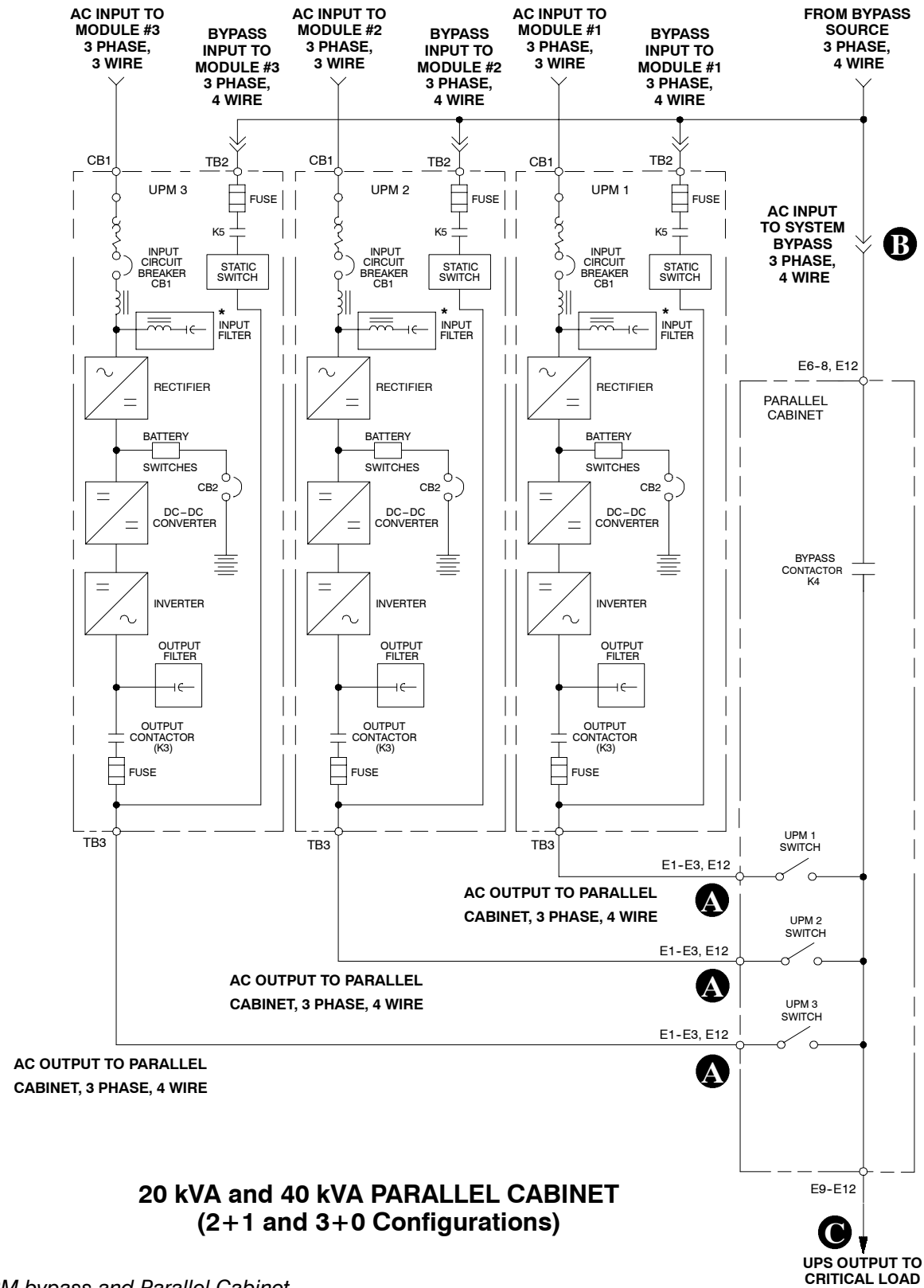
20 kVA and 40 kVA PARALLEL CABINET (1+1 and 2+0 Configurations)

* OPTIONAL

NOTE: *1. UPM bypass and Parallel Cabinet bypass input feeds must come from the same source.*

2. A bypass neutral feeder must be supplied.

DESCRIPTION:	**ONELINE DRAWINGS OF PARALLEL SYSTEM**		
DRAWING NO:	164201363–5	*SHEET:*	1 of 3
REVISION:	A	*DATE:*	061502



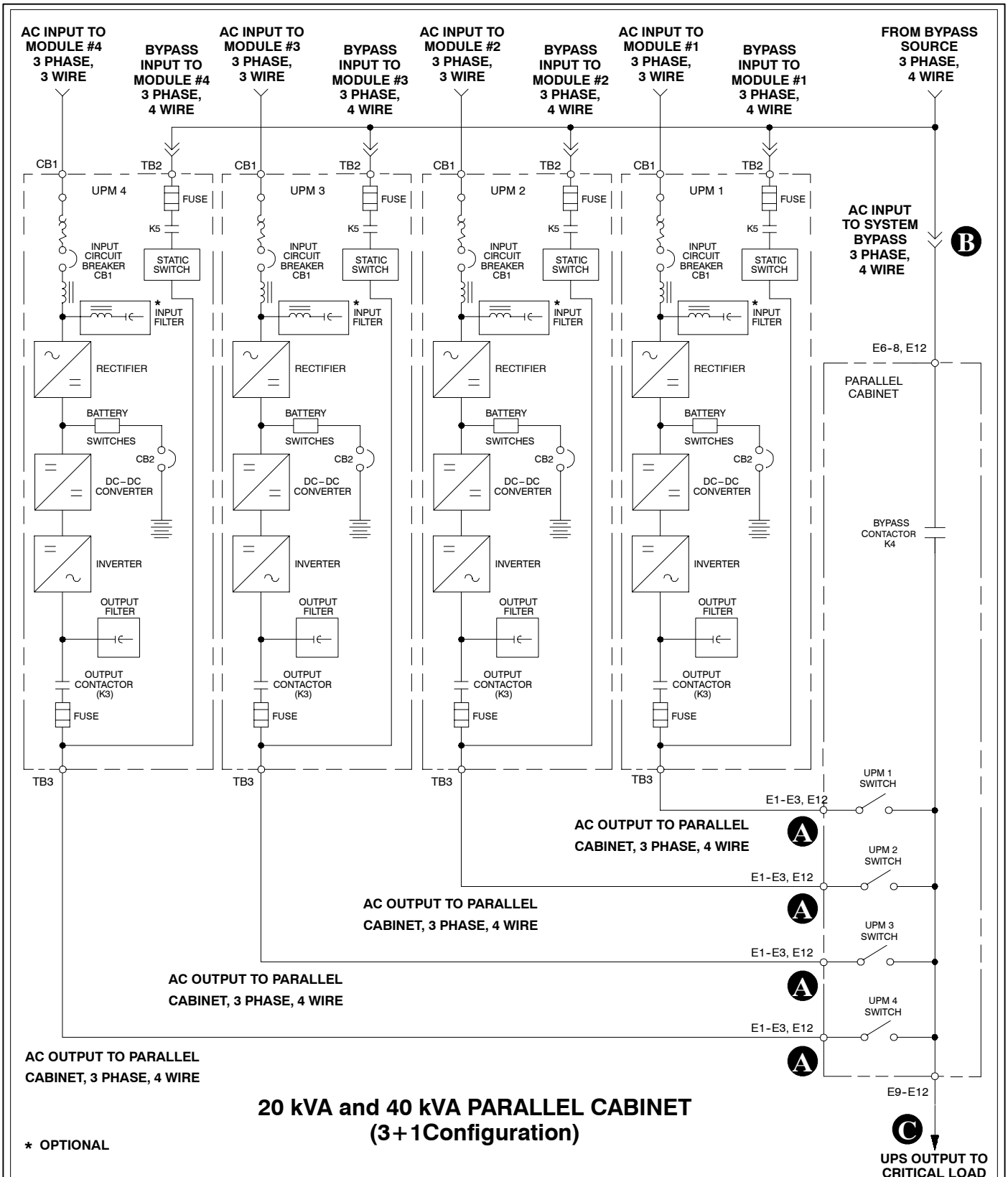
20 kVA and 40 kVA PARALLEL CABINET (2+1 and 3+0 Configurations)

*** OPTIONAL**

NOTE: *1. UPM bypass and Parallel Cabinet bypass input feeds must come from the same source.*

2. A bypass neutral feeder must be supplied.

DESCRIPTION:	**ONELINE DRAWINGS OF PARALLEL SYSTEM**		
DRAWING NO:	164201363–5	*SHEET:*	2 of 3
REVISION:	A	*DATE:*	061502



20 kVA and 40 kVA PARALLEL CABINET (3+1Configuration)

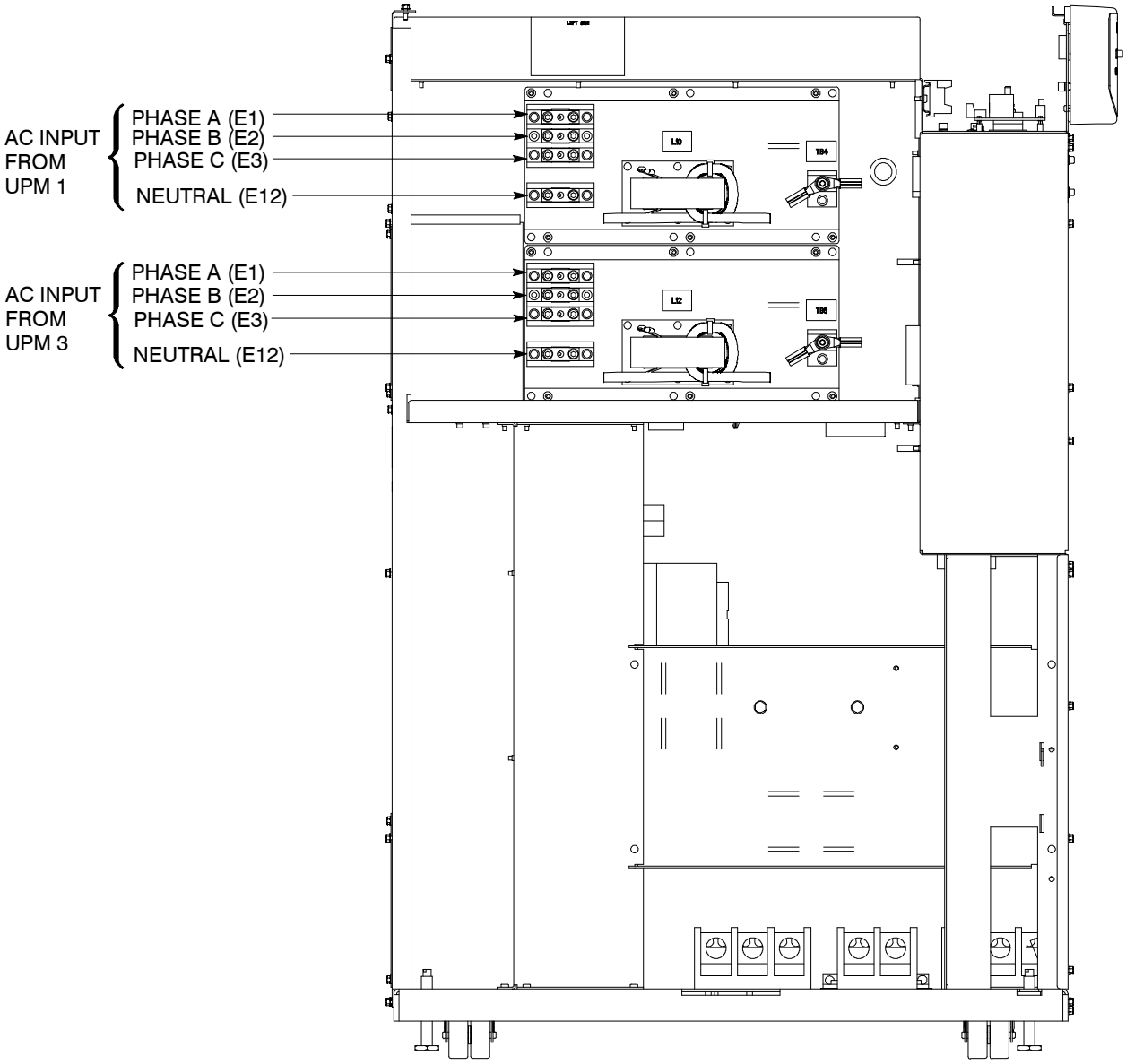
*** OPTIONAL**

NOTE: *1. UPM bypass and Parallel Cabinet bypass input feeds must come from the same source.*

2. A bypass neutral feeder must be supplied.

DESCRIPTION:	**ONELINE DRAWINGS OF PARALLEL SYSTEM**		
DRAWING NO:	164201363–5	*SHEET:*	3 of 3
REVISION:	A	*DATE:*	061502

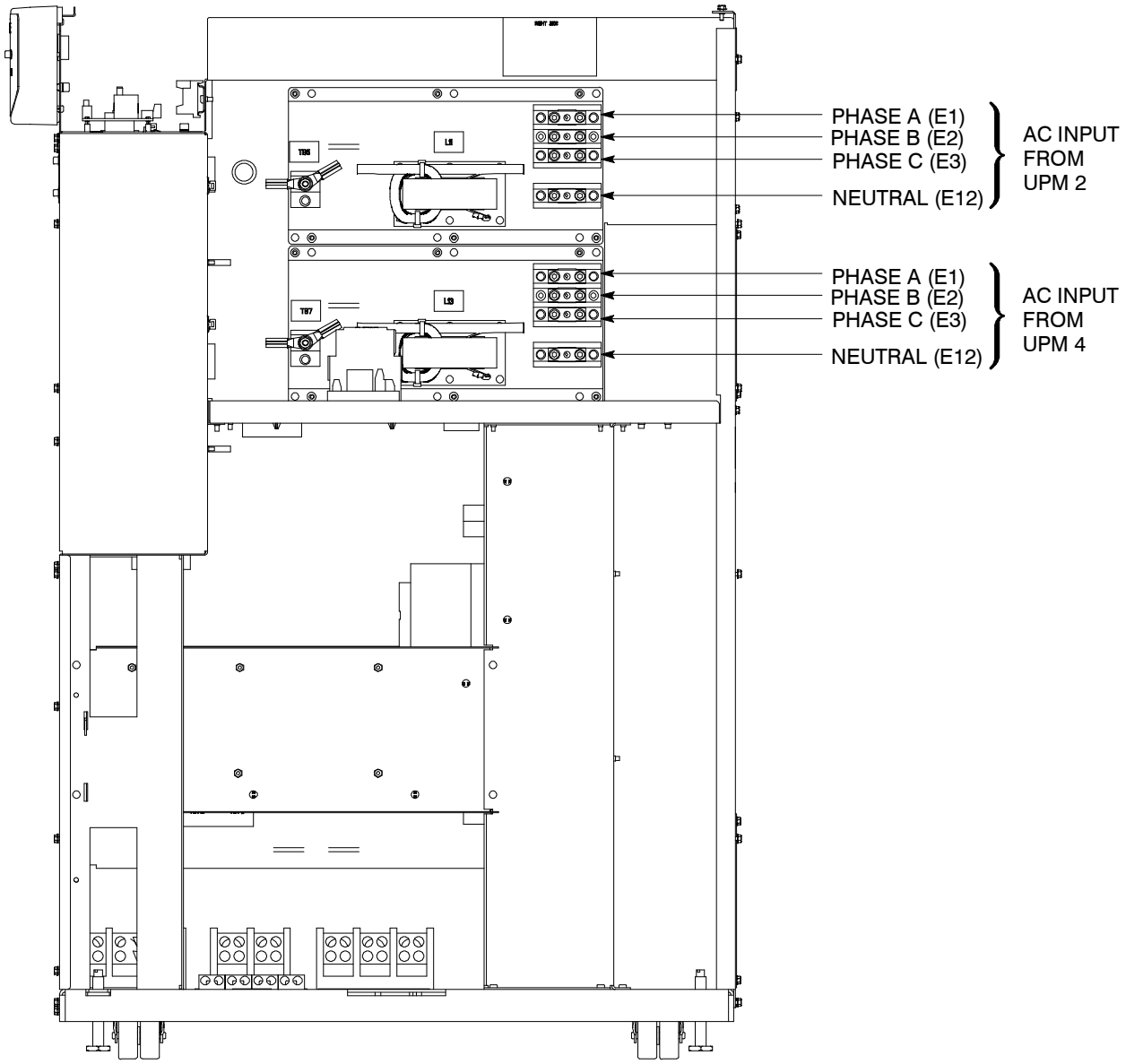
PARALLEL CABINET POWER TERMINALS



LEFT VIEW

DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	1 of 8
REVISION:	A	*DATE:*	061502

PARALLEL CABINET POWER TERMINALS

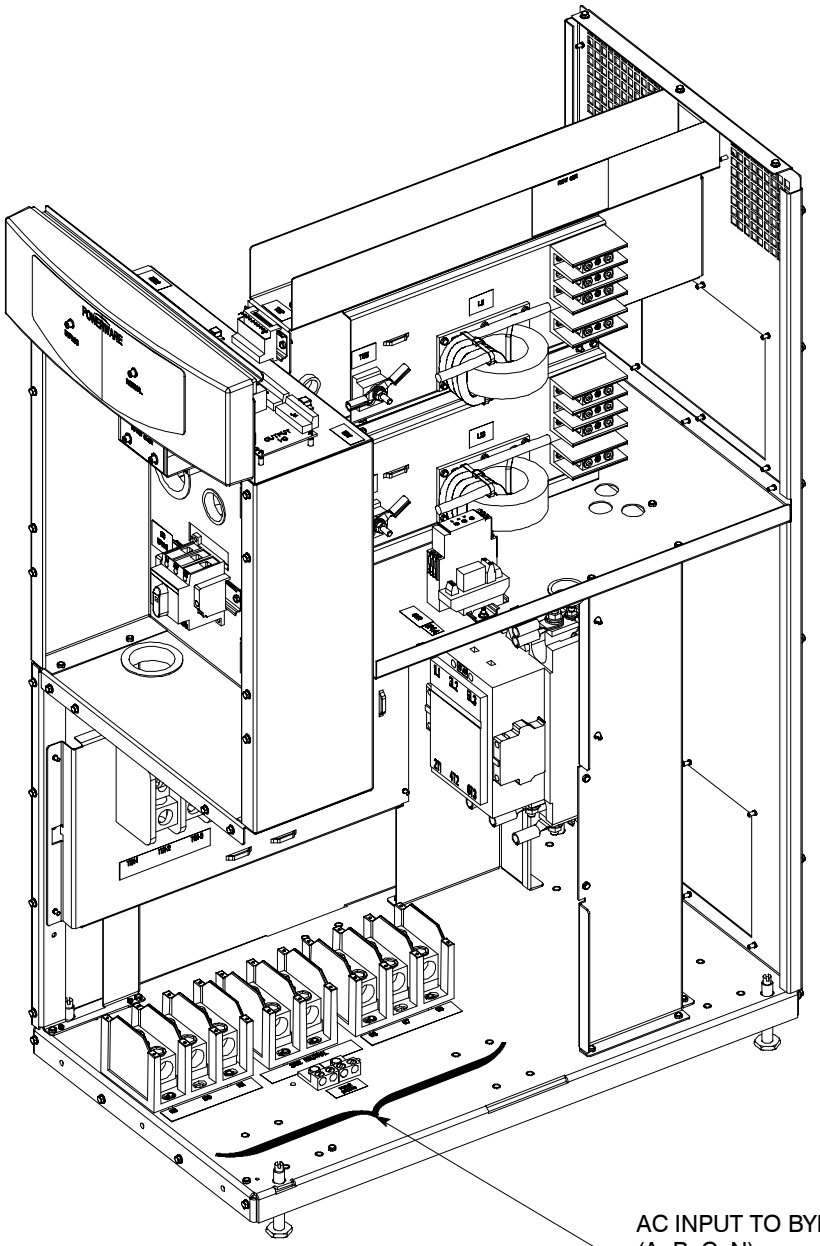


RIGHT VIEW

DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	2 of 8
REVISION:	A	*DATE:*	061502

PARALLEL CABINET POWER TERMINALS

20 kVA 1+1, 2+0, 2+1, 3+0, and 3+1 Configuration
40 kVA 1+1, 2+0, and 2+1 Configurations



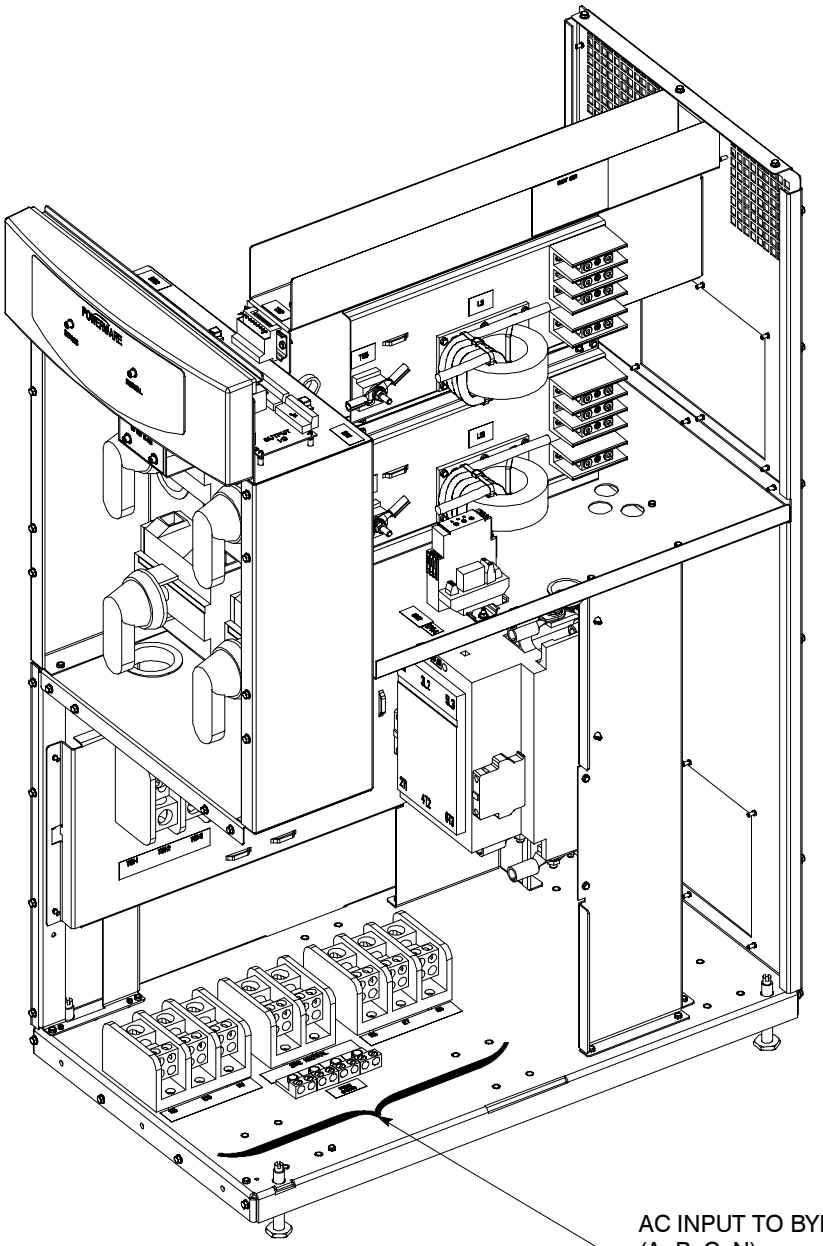
AC INPUT TO BYPASS
(A, B, C, N)
AC OUTPUT TO
CRITICAL LOAD
(A, B, C, N)

} (SEE SHEET 5 FOR DETAILS)

DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	3 of 8
REVISION:	A	*DATE:*	061502

PARALLEL CABINET POWER TERMINALS

40 kVA 3+0, and 3+1 Configurations



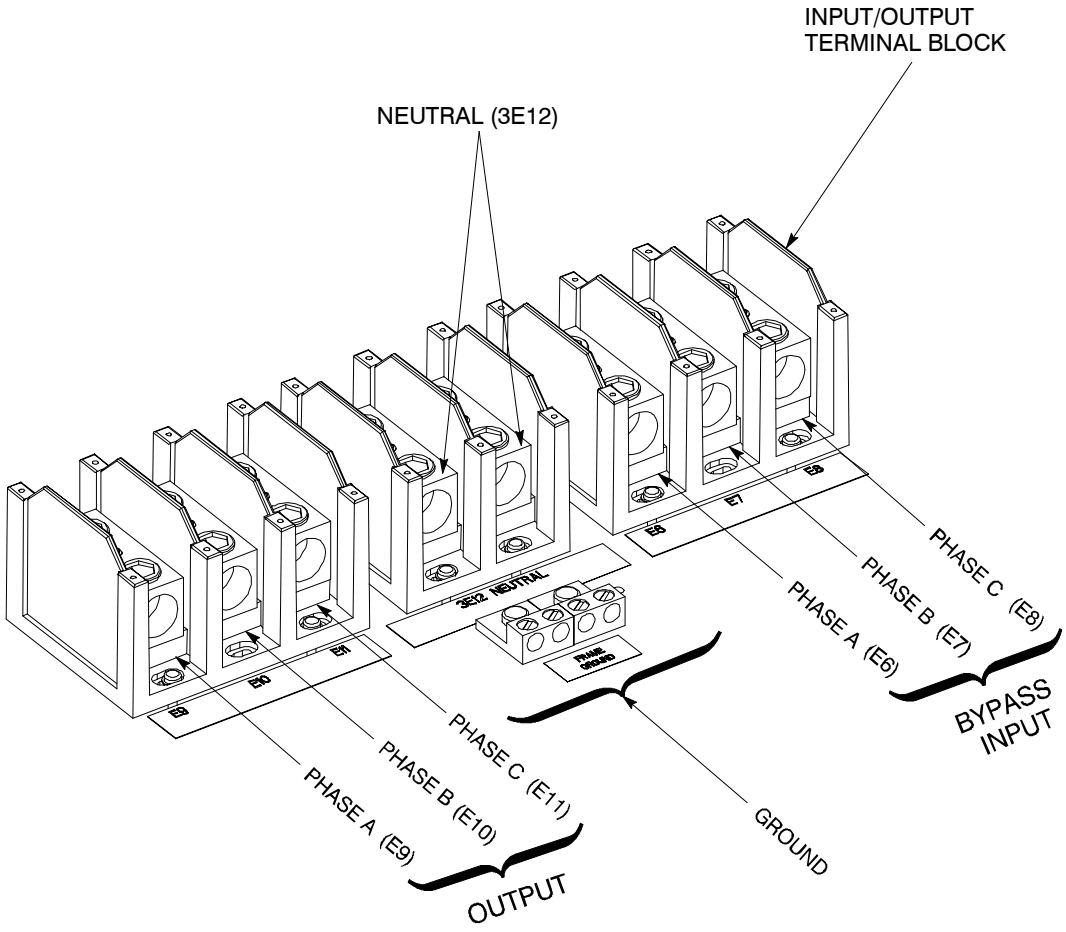
AC INPUT TO BYPASS
(A, B, C, N)
AC OUTPUT TO
CRITICAL LOAD
(A, B, C, N)

(SEE SHEET 6
FOR DETAILS)

DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	4 of 8
REVISION:	A	*DATE:*	061502

PARALLEL CABINET POWER TERMINALS

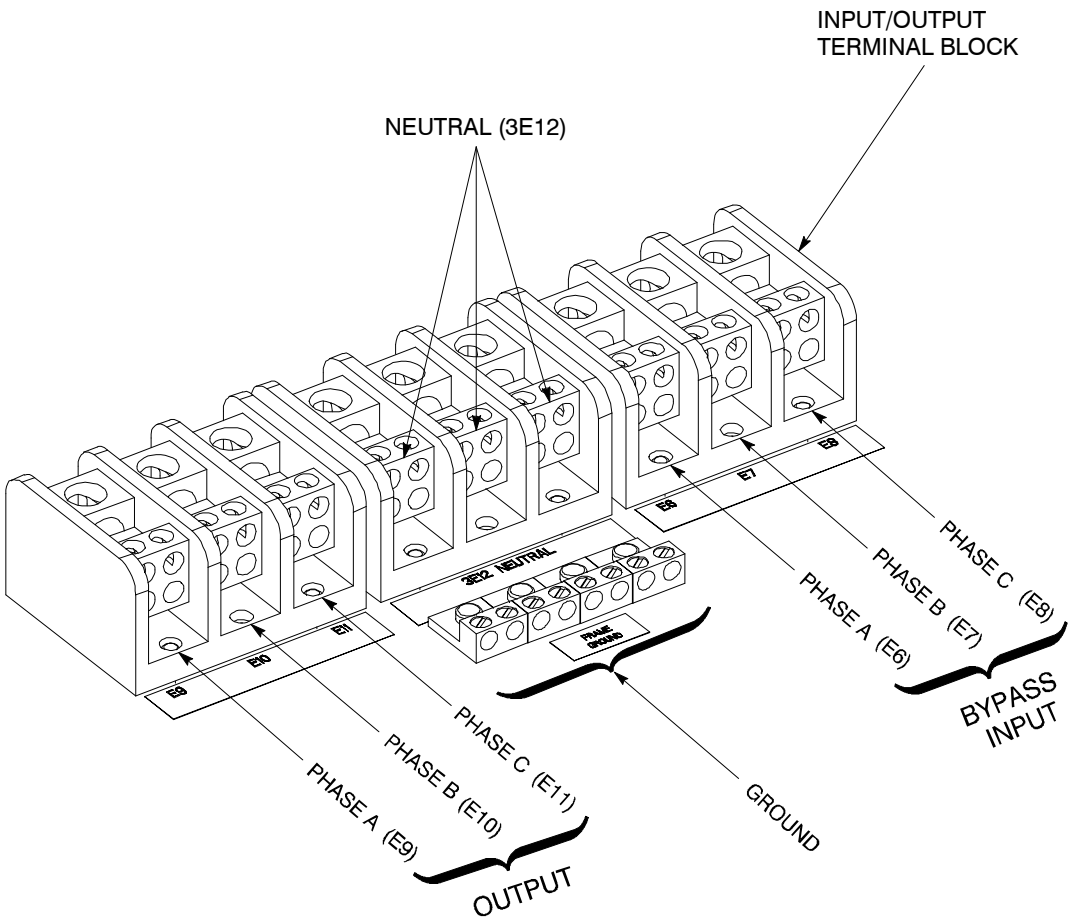
20 kVA 1+1, 2+0, 2+1, 3+0, and 3+1 Configuration
40 kVA 1+1, 2+0, and 2+1 Configurations



DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	5 of 8
REVISION:	A	*DATE:*	061502

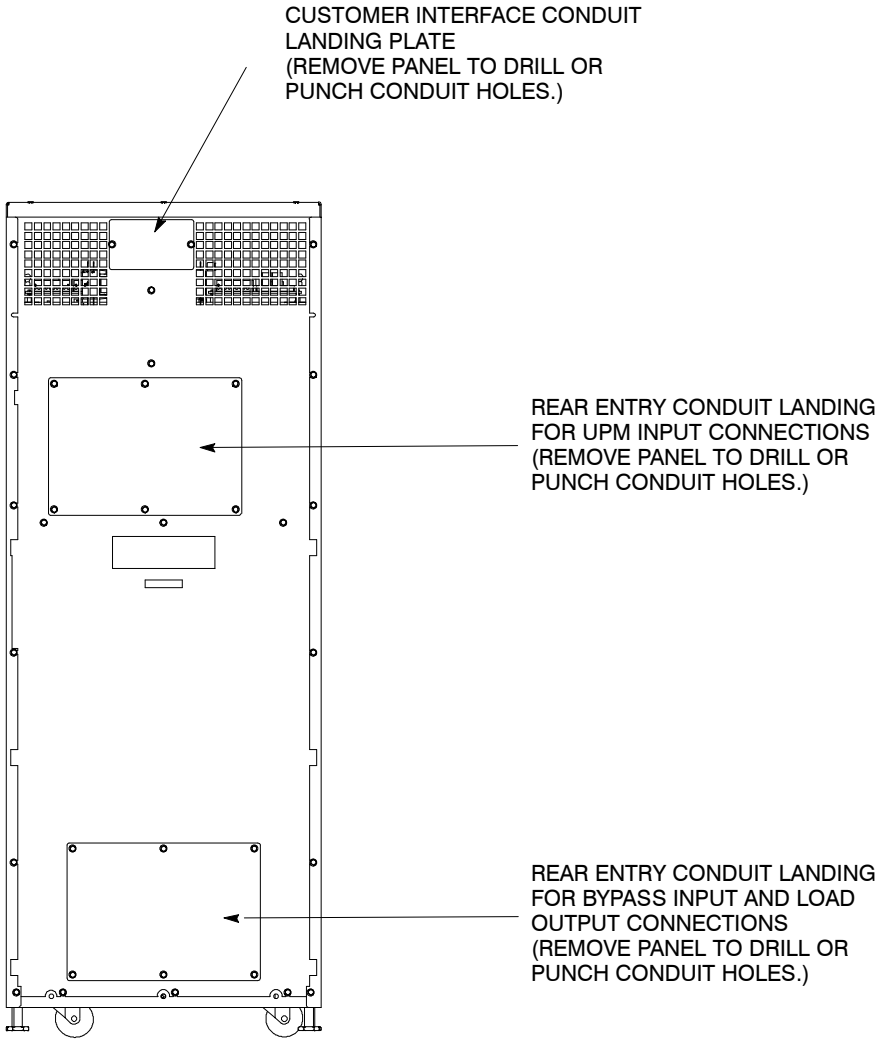
PARALLEL CABINET POWER TERMINALS

40 kVA 3+0, and 3+1 Configurations



DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	6 of 8
REVISION:	A	*DATE:*	061502

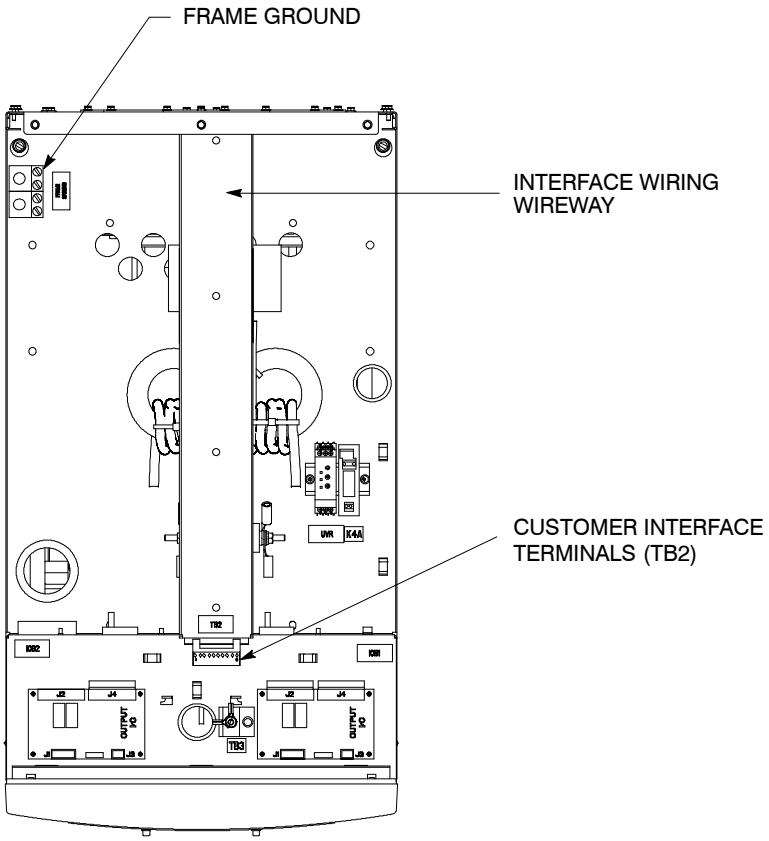
PARALLEL CABINET CONDUIT LANDING PLATES



PARALLEL CABINET
REAR VIEW

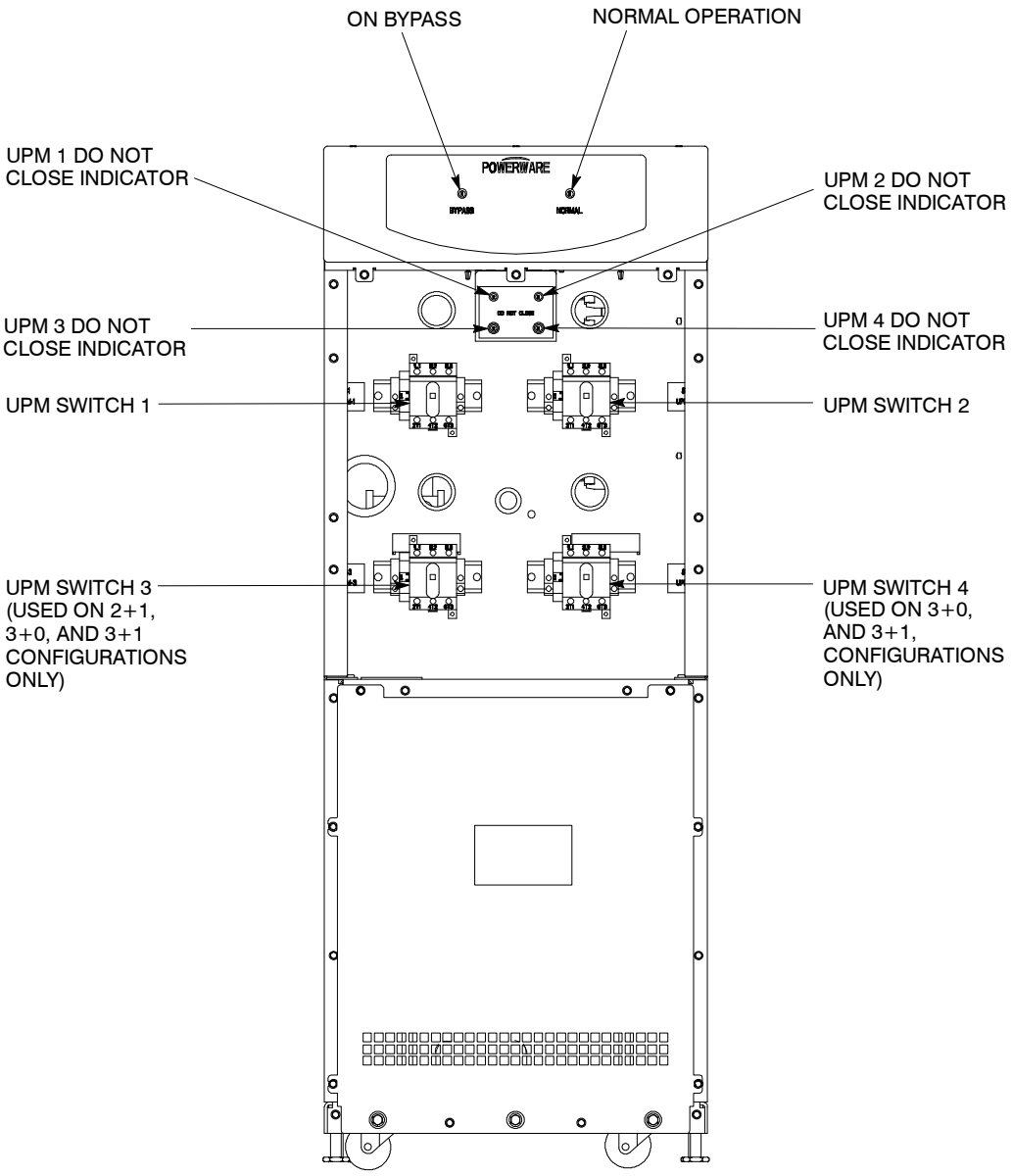
DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	7 of 8
REVISION:	A	*DATE:*	061502

PARALLEL CABINET UPM NEUTRAL, GROUND AND CUSTOMER INTERFACE TERMINALS



TOP VIEW

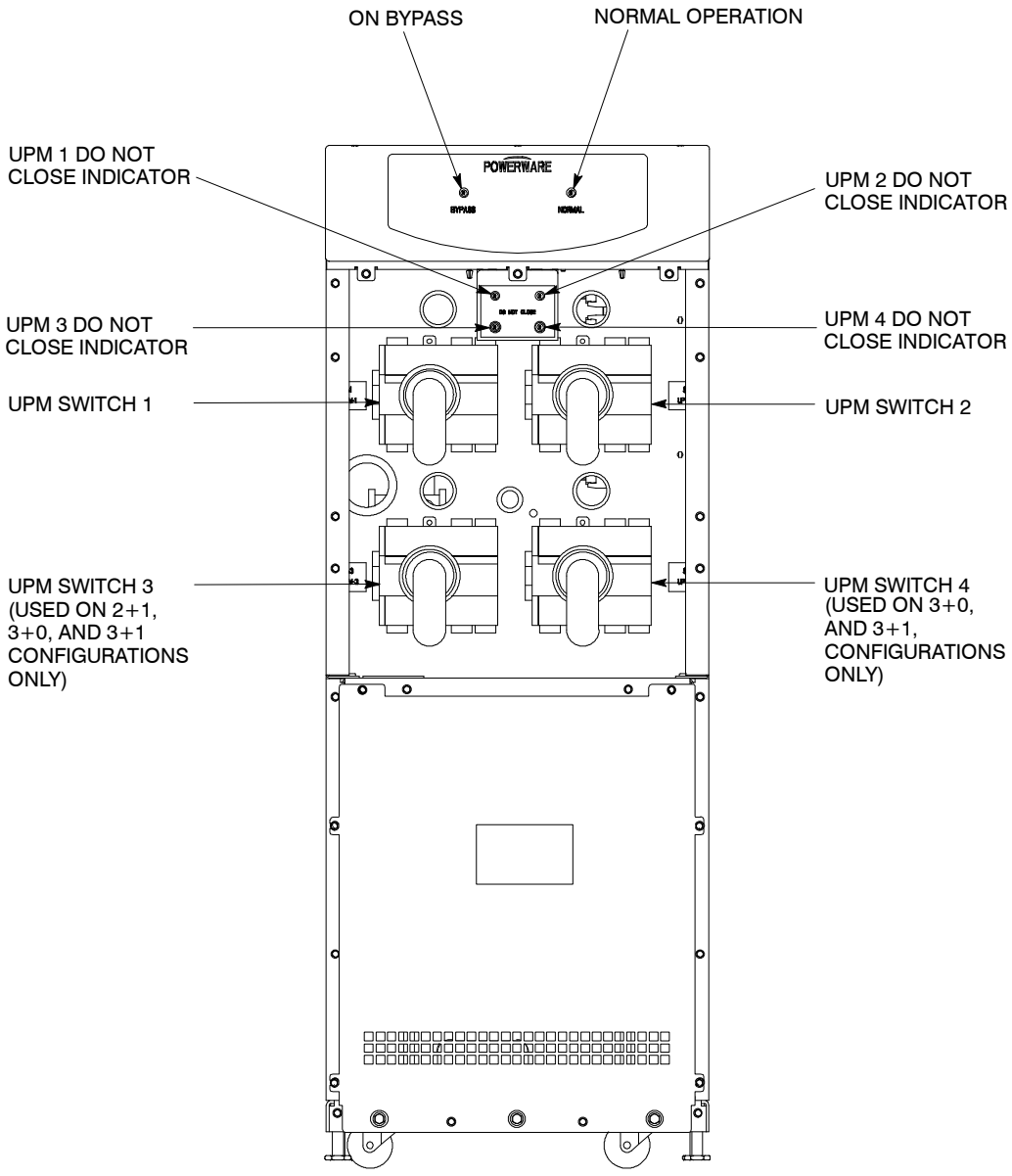
DESCRIPTION:	**LOCATION OF PARALLEL CABINET TERMINALS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–6	*SHEET:*	8 of 8
REVISION:	A	*DATE:*	061502


ON BYPASS
NORMAL OPERATION
UPM 1 DO NOT CLOSE INDICATOR
UPM 2 DO NOT CLOSE INDICATOR
UPM 3 DO NOT CLOSE INDICATOR
UPM 4 DO NOT CLOSE INDICATOR
UPM SWITCH 1
UPM SWITCH 2
UPM SWITCH 3 (USED ON 2+1, 3+0, AND 3+1 CONFIGURATIONS ONLY)
UPM SWITCH 4 (USED ON 3+0, AND 3+1, CONFIGURATIONS ONLY)
POWERWARE
BYPASS
NORMAL

20 KVA PARALLEL CABINET

NOTE: UPM Disconnect switches and DO NOT CLOSE Indicators are for installation and service use only.
An illuminated LED represents a condition where a service disconnect switch is open and should not be closed. These switches are not customer accessible and a qualified service representative must be contacted to perform corrective action. To schedule a service call, contact Powerware Customer Service.

DESCRIPTION:	**PARALLEL CABINET CONTROLS AND INDICATORS**		
DRAWING NO:	164201363–7	*SHEET:*	1 of 2
REVISION:	B	*DATE:*	101503

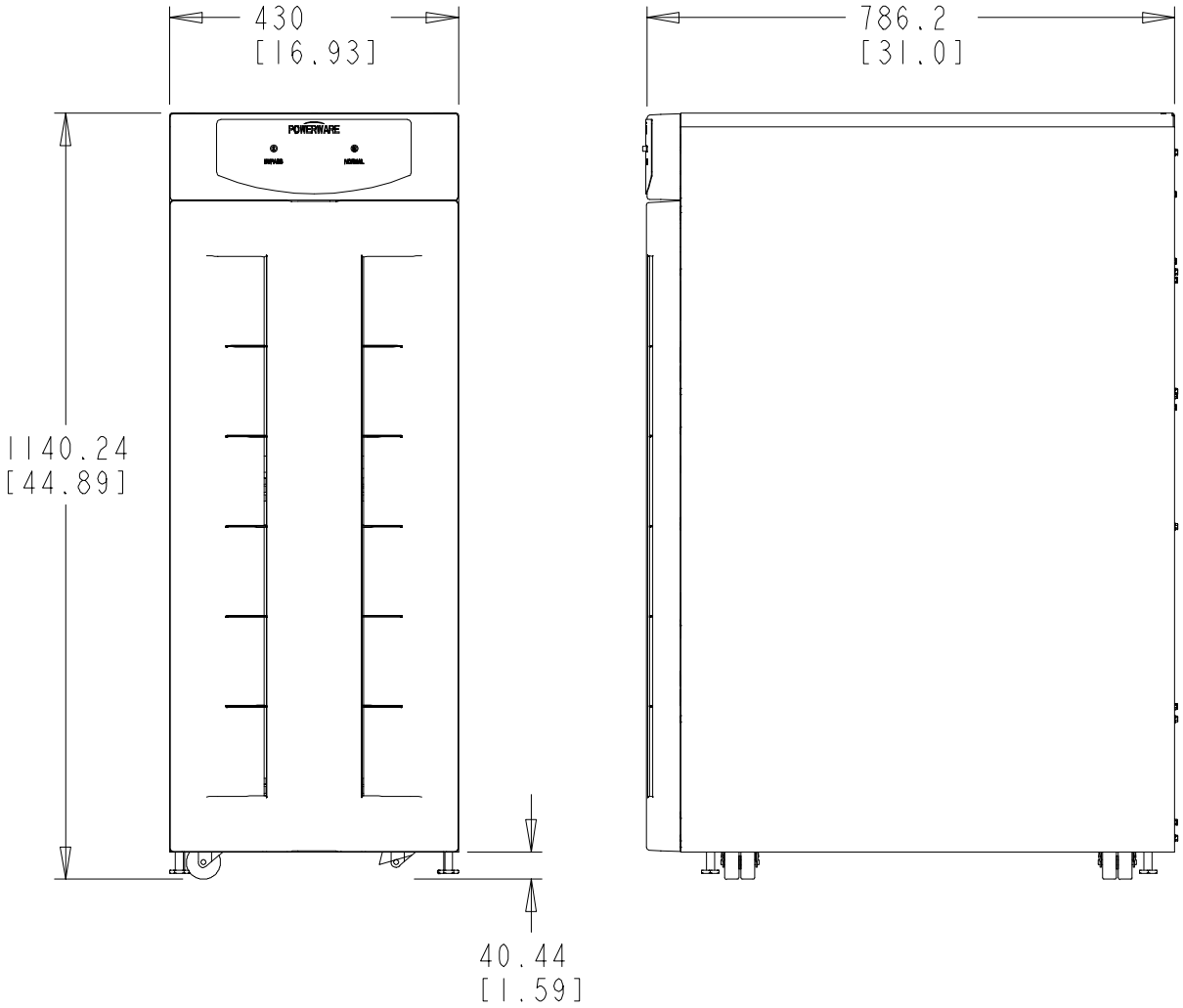

ON BYPASS
NORMAL OPERATION
POWERWARE
BYPASS
NORMAL
UPM 1 DO NOT CLOSE INDICATOR
UPM 2 DO NOT CLOSE INDICATOR
UPM 3 DO NOT CLOSE INDICATOR
UPM 4 DO NOT CLOSE INDICATOR
UPM SWITCH 1
UPM SWITCH 2
UPM SWITCH 3 (USED ON 2+1, 3+0, AND 3+1 CONFIGURATIONS ONLY)
UPM SWITCH 4 (USED ON 3+0, AND 3+1, CONFIGURATIONS ONLY)

40 KVA PARALLEL CABINET

NOTE: UPM Disconnect switches and DO NOT CLOSE Indicators are for installation and service use only.
An illuminated LED represents a condition where a service disconnect switch is open and should not be closed. These switches are not customer accessible and a qualified service representative must be contacted to perform corrective action. To schedule a service call, contact Powerware Customer Service.

DESCRIPTION:	**PARALLEL CABINET CONTROLS AND INDICATORS**		
DRAWING NO:	164201363–7	*SHEET:*	2 of 2
REVISION:	B	*DATE:*	101503

PARALLEL CABINET



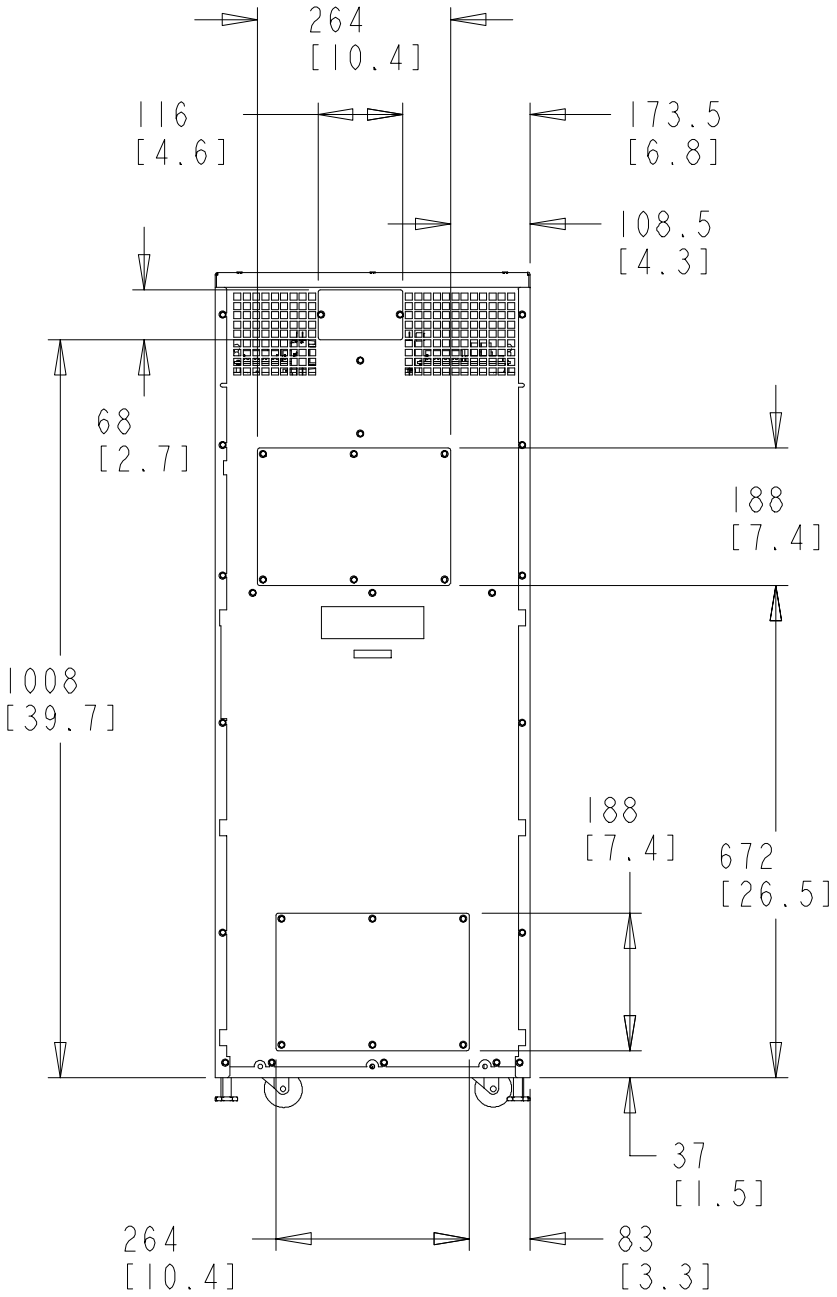
PARALLEL CABINET
FRONT VIEW

PARALLEL CABINET
RIGHT VIEW

Dimensions are in millimeters and [inches]

DESCRIPTION:	**PARALLEL CABINET DIMENSIONS POWERWARE 9330 20 kVA and 40 kVA**		
DRAWING NO:	164201363–8	*SHEET:*	1 of 2
REVISION:	A	*DATE:*	061502

PARALLEL CABINET



PARALLEL CABINET
REAR VIEW

Dimensions are in millimeters and [inches]

DESCRIPTION:	**PARALLEL CABINET DIMENSIONS POWERWARE 9330**		
DRAWING NO:	164201363–8	*SHEET:*	2 of 2
REVISION:	A	*DATE:*	061502

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LIMITED FACTORY WARRANTY FOR THREE-PHASE POWERWARE PRODUCTS

Subject to the conditions herein, *Powerware* (*Powerware*®) warrants solely, to the original end-user, the electronics (the "Unit"), and *Powerware* built battery cabinets, against defects in material and workmanship for the warranty period of 12 months, from the date of equipment start up, or 18 months from date of shipment, whichever occurs first. Should service be necessary, this warranty covers:

USA only: The *Powerware* 9315, 9330, 9335 three-phase UPS products are sold with a standard factory warranty (described below), start up, and extended labor service.

All three-phase UPS installations will have an authorized *Powerware* Service Engineer or Agent perform startup or the factory warranty and extended labor service will be void. The included first year extended labor service provides for a complete 12 months of onsite labor for your UPS purchase.

Worldwide: All parts requiring replacement for the Factory Warranty period.

If, in the opinion of *Powerware*, the Unit fails to meet published specifications and the defect is within the terms of this warranty, the Unit will be repaired or replaced at the option of *Powerware* with no charge for replacement parts. Labor required, to make upgrades, repairs or replacement installation, is not included under the terms of this Limited Warranty, except for labor and travel costs required during the first 90 days of this warranty (USA only), provided that startup of the unit onsite, has been performed by *Powerware* or its agent. Equipment sold, but not manufactured by *Powerware*, and only the manufacturer of such equipment shall warrant this equipment and is not included as part of this warranty agreement. Equipment repaired or replaced pursuant to this warranty will be warranted for the remaining portion of the original warranty subject to all the terms thereof.

This warranty is not valid unless an authorized *Powerware* Service Engineer or Agent performs startup and commissioning. This warranty does not apply to any Unit that has been subject to neglect, accident, abuse, misuse, misapplication, incorrect installation, or that has been subject to repair or alteration, not authorized in writing by *Powerware* personnel or performed by an authorized *Powerware* Service Engineer or Agent. Purchaser shall be invoiced for, and shall pay for, all services not expressly provided for by the terms hereof, including, without limitation, site calls involving an inspection that determines no corrective maintenance is required. THIS WARRANTY IS THE PURCHASER'S (USER'S) SOLE REMEDY AND IS EXPRESSLY IN LIEU OF, AND THERE ARE NOT OTHER, EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED). In no case will *Powerware's* liability under this Warranty exceed the replacement value of the Unit warranted.

Invensys Powerware's obligation, under said warranty, is expressly conditioned upon receipt by *Powerware* of all payments due it (including interest charges, if any). During such time as *Powerware* has not received payment of any amount due it, in accordance with the Contract terms under which the equipment is sold, *Powerware* shall have no obligation, under said warranty; also during this time, the period of said warranty shall continue to run and the expiration of said warranty shall not be extended upon payment of the overdue amount. These limitations, to said warranty, apply even in the event that the equipment is sold initially by *Powerware* for resale to an ultimate end-user.

In no event shall *Powerware* be liable for any indirect, incidental special or consequential damages of any kind or type whatsoever, or based on any claim or cause of action, however denominated. *Powerware* shall not be responsible for failure to provide service or parts due to causes beyond *Powerware's* reasonable control. This limited warranty applies only to the original end user of the unit.

This factory warranty will not be in effect if the End-User does not properly store the equipment, including the "trickle charge" of batteries no later than the date indicated on the packaging, before installation and does not cover shipping damages if FOB Factory. Cost for replacement equipment, installation, material freight charges travel expenses and labor of *Powerware* representatives will be borne by the Purchaser (user). Any advice furnished the Purchaser before or after delivery in regard to use or application of *Powerware* equipment is furnished without charge and on the basis that it represents *Powerware's* best judgment under the circumstances. The use of any such advice by the Purchaser is solely and entirely at its own risk. Any other agreements, such as Service contracts or Sales Concessions are not means to annul this Factory Warranty.

For comment or questions, about this Limited Factory Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, NC 27601, or call (919) 872–3020

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164201363 Rev B